



CAMERON COUNTY

DEPARTMENT OF TRANSPORTATION
BENJAMIN L. WORSHAM, P.E. ★ COUNTY ENGINEER

July 01, 2022

Natalie Bell
Manager, Beach Access & Dune Protection Program
Coastal Resources Division
Texas General Land Office
1700 N. Congress Ave. Austin, TX
78701-1495

Re: Cameron County Dune Protection Plan Minor Revision.

Dear Mrs. Bell,

This letter is to notify the Texas General Land Office that on June 21, 2022, the Cameron County Commissioners Court approve a minor amendment to the current Dune Protection Plan and Erosion Response Plan. Sections IV.A.6 of the Dune Protection and Beach Access Plan and the section 5.3.1 of the Erosion Response Plan stated that “Curbs shall not be wider than 6 inches or more than 10 inches high/deep” and they now state: “Curbs shall not be wider than 6 inches or more than 12 inches high/deep”. This revision now better reflect current industry standards for curb-and-gutter and the potential negative impacts are considered negligible.

Attached to this letter you will find the updated Dune Protection Plan and the approved Commissioners Court agenda item. You can reach me at augusto.sanchez@co.cameron.tx.us should you have any questions.

Sincerely,

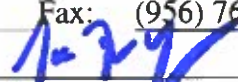


Augusto Sánchez González
Natural Resources Coordinator
Cameron County Dept. of Transportation
390 W. Expressway 83
San Benito, TX 78586

CC: Joe E. Vega, Cameron County Parks Director
Benjamin Worsham, Cameron County Engineer
Juan Gonzalez, Cameron County Chief Legal Counsel

Cameron County Commissioners' Court Agenda Request Form

No. _____

Date: June 16, 2022 Meeting Date Request: June 21, 2022
Deadline for Action: _____ Contact Person: Joe E. Vega
Department: Parks & Recreation Phone: (956) 761-3700 Fax: (956) 761-5317
Department Head Name: Joe E. Vega Signature: 

Caption: CONSENT

Consideration and Authorization to revise the Cameron County Dune Protection and Beach Access Plan section IV.A.6 and the Cameron County Erosion Response Plan section 5.3.1 to reflect curb-and-gutter dimensions industry standard.

Background:

The current plan states that "Curbs shall not be wider than 6 inches or more than 10 inches high/deep". Standard dimensions are 12in high/deep. Revising this typographic error will better reflect current industry standard for curb-and-gutter and will have and its impact can be considered negligible.

PLEASE FILL IN ALL BLANKS WITH REQUIRED INITIALS AND FISCAL DATA INFORMATION OR PLACE N/A IF IS NOT APPLICABLE:

County Judge N/A Auditor N/A Budget _____ Legal _____ Human Resources N/A Purchasing N/A

Construction Manager N/A Natural Resources Coordinator ASg

1295 Form N/A

Fiscal Data:

Dept. Name: N/A Fund No. N/A
Funds Available: Yes No

Funds From:

Department: Yes No Amt. Expended : \$ N/A
General: Yes No Impact on future budget: Yes No
Grant: Yes No

Comments:

Action taken by Commissioners' Court

Approved _____ Tabled _____ Denied _____ Motion made by _____ Seconded _____ Vote _____



CAMERON COUNTY DUNE PROTECTION AND BEACH ACCESS PLAN

Adopted on September 20, 1994

Amended on
August 29, 2006
August 26, 2010
August 23, 2013
December 11, 2018
July 21, 2022

FINAL DRAFT

I. BACKGROUND

A. LEGISLATIVE INTENT

With passage of the 71st Legislature's SB 1571 in 1989, the Texas General Land Office was charged with assembling a Coastal Management Advisory Committee and initiating consideration of various issues affecting the Texas coast. A number of Cameron County residents were involved with the various hearings and workshops conducted by the Texas General Land Office in development of the Coastal Management Plan. In general, the Plan developed by this committee and the Land Office constituted a broad-based, issue-oriented discussion. It was recognized by the committee that due to the size and diversity of the Texas coast, specific local level planning was necessary to address unique situations in local environments. As a result, the 72nd Legislature in 1991 passed Senate Bill 1053 which charged Texas with counties along the Gulf of Mexico with development of local level coastal planning and management documents. Counties, as coordinating authorities, could delegate planning or incorporated areas to appropriate cities or towns. Although this Legislation mandated and authorized a variety of state and local government actions, the fundamental objective outlined in SB 1053 was:

1. the development of local public beach access plans that would afford and guarantee the public's right to beach access and use including a certification process for beachfront construction to prevent impairment of beach access, and
2. establishment of a dune protection line and a permitting process to protect coastal dune systems, and
3. strengthening flood protection measures to protect the community from the perils of flood damage.

B. CAMERON COUNTY'S RESPONSE TO SB 1053

It was the intent of Cameron County Commissioners to move aggressively forward with development of a plan for Cameron County, even prior to the Texas General Land Office's development of rules for SB 1053. Accordingly, the Commissioners Court, in July of 1991, appointed a Coastal Management Committee composed of seven citizens. The seven committee members were selected to represent a broad array of diverging interests, and different geographic regions of the County. Technical advisors, as well, were selected to represent a diversity of backgrounds and expertise with an emphasis on those familiar with the Cameron County coastline. Also, appointed without voting status were four adjunct committee members, and eight technical advisors. The Commissioners charged the Committee with "fast track" action that would assure production of a plan that took into account all major relevant factors affecting lands and environments of the Cameron County Coastal area, without complicating this planning process by

burdensome and extensive delays.

The 1992 Cameron County Public Beach Access and Dune Protection Plan was developed over a five (5) month period, commencing in early July and completed in November of 1991. A county approved plan was forwarded from Cameron County to the Texas General Land Office for review and comment in accordance with the requirements of SB 1053. After revisions to address comments by the Texas General Land Office, the 1992 Cameron County Public Beach Access and Dune Protection Plan received approval on an interim basis by the Texas General Land Office in March 1993, and became the operative planning document for land development projects in the county's unincorporated coastal areas. Subsequent to interim approval of the plan, the Texas General Land Office developed rules which necessitated with requirements and conditions stipulated in the rules. Accordingly Cameron County staff, the Parks prepared and presented a revised plan in the summer of 1994. Cameron County Commissioners in compliance with public hearing requirements reviewed and approved the revised plan on October 20, 1994.

The Court's purpose of this plan is to embrace the intent of SB 1053 so that public beach access and use along all Cameron County beaches are guaranteed in perpetuity by provision of adequate access points, to ensure that Cameron County will be protected from flood losses, and additionally to assure that the integrity of the beach/dune system is maintained and enhanced while recognizing landowner's private property rights, and affording mitigating options to the landowner that would protect dunes, while not unreasonably restricting private land use.

C. LEGAL AUTHORITY FOR PLAN ADOPTION

The GLO has adopted rules describing the process for development, adoption, and certification of an ERP (31 TAC §15.17). Cameron County Commissioners Court, under authority granted by Senate Bill No. 1053, hereby establishes the Cameron County Public Beach Access and Dune Protection Plan in accordance with State statutes and requirements, and adopts all beach management practices relative to: protecting the beach /dune system seaward of the defined dune protection line, flood protection and public beach access requirements as represented in the plan. Additionally, Cameron County establishes, by order of Cameron County Commissioners Court (Court Order 1994-02), the Cameron County Public Beach Access interim 1992 CAMERON COUNTY PUBLIC BEACH ACCESS AND DUNE PROTECTION PLAN (COURT ORDER 1992-1), upon certification of said plan by Texas General Land office and Attorney General.

II. PUBLIC BEACH ACCESS IN UNINCORPORATED AREAS

A. BEACHFRONT CONSTRUCTION CERTIFICATES

Beachfront construction certificates are required under Natural Resources Code §61.015 (c) - (h) for any construction within 1000 feet of mean high tide or up to

the first public road, whichever distance is greater. The Cameron County Park System, operating through Cameron County Commissioners Court and advised by the Cameron County Dune Protection Committee, is hereby charged with responsibility for administering the beach access component of this plan. The Cameron County Parks Director and/or County Engineer shall be responsible for sending Beachfront Construction Applications to the GLO. Upon the GLO's confirmation of consistency and completeness, the application for beachfront construction certificates shall be reviewed by the Cameron County Dune Protection Committee which shall issue a recommendation within six (6) weeks of the date that the Committee receives the application. Cameron County Commissioners' Court will review and take action on beachfront construction certificates as advised by parks system staff and the Cameron County Dune Protection Committee, whose recommendations will be considered but are not binding on court action. Neither the County nor the GLO shall unreasonably delay review or action on an application.

Findings necessary by the Court to issue a beachfront construction certificate are:

1. the proposed project does not (directly or indirectly) reduce the size or encroach on the public beach in any manner, or impair or adversely affect public use of or access to and from a public beach, or
2. the proposed project does not functionally support or depend on or is otherwise related to proposed or existing structures that encroach on the public beach, regardless of whether the encroaching structure is on land that was previously landward of the public beach.

Specific requirements for the Beachfront Construction and Dune Protection Permit applications and Exemption Petitions are detailed in the County's Erosion Response Plan section 5 (See Appendix A).

B. REVISION OF BEACH ACCESS COMPONENT OF PLAN

Revision or update of the public beach access component of this plan shall be initiated by the Cameron County Dune Protection Committee. Prior to taking any action on an advisory board recommendation, the Cameron County Commissioners Court shall conduct a public hearing. Approved plan changes shall be forwarded to the Texas General Land Office for review and comment.

C. PUBLIC SAFETY FINDINGS

Cameron County recognizes that drive-on vehicular operations on beaches currently afford most public beach access in unincorporated county areas. The Commissioners Court hereby establishes a beach access plan that provides for a continuance of vehicle access to some County beaches, but that institutes better management controls of vehicular beach use. Further, Cameron County hereby

establishes that County's intent to incrementally redesignate selected vehicular beaches to pedestrian beaches by provision of public off beach parking lots and beach access parks. Cameron County will whenever practical and in addition to legal requirements of A.D.A. laws, maintain and enhance free (no fee) beach access areas. Where practical, Cameron County will use walkovers to preserve and enhance beach access.

Upon Cameron County planning for adequate parking or public access to the beaches where vehicular access is restricted, it was determined that it was impractical to provide public access while protecting the existing dune system. It was also determined that it was impossible to provide parking every ½ mile from one another along Park Road 100 because of the existing geographic characteristics making it unfeasible by weakening and destroying significantly critical dunes. Therefore, Cameron County has attempted to overcompensate by providing 88 more parking spaces than required for the linear footage of beach closed to vehicles, with most of the additional parking found at Beach Access Number 3.

A number of issues and problems associated with vehicular traffic on county beaches led to the recognition that vehicles should be restricted from specific sections of Cameron County beaches, similar to current restrictions in county parks and the beaches of the Town of South Padre Island. These issues include:

1. Pedestrian safety - the operation of motor vehicles on beach areas containing heavy pedestrian usage, even when in compliance with all rules and regulations, is inherently unsafe.
2. Stranding of motorists - Often motorists become stranded while operating vehicles on public beaches, thus creating a traffic hazard and impeding traffic flow, as well as creating hazards to nearby pedestrians.
3. Litter - the volume and frequency of littering activity associated with pedestrian beach areas is notably lower in comparison to areas where beach users gain beach access by vehicle and picnic in the vicinity of vehicles on the public beach.
4. Unauthorized vehicle operation - Inadvertent as well as intentional operation of two-wheel drive and four-wheel drive motor vehicles in the fore dune areas or loose sand areas causes beach erosion, dune erosion decreases flood protection and disturbs or destroys vegetation.
5. Recreationist's security - the presence of motor vehicles and activities sometimes associated with motor vehicle operation has generally left an insecure feeling to other beach users particularly families with young children, on beach areas experiencing high-density use. It is generally recognized by families and persons seeking a crime free environment that the vehicular beaches are the place of last resort.

D. BEACH ACCESS COMPONENT

Use of Beach User Fee Revenues

Revenue from beach user fees may be used only for beach-related services. “Beach-related services” means reasonable and necessary services and facilities directly related to the public beach which are provided to the public to ensure safe use of and access to and from, and the standard maintenance and operation expenses such as but not limited to vehicular controls, management, and parking (including acquisition and maintenance of off-beach parking and access ways); sanitation and litter control; the cleaning or removal of debris from the beach by handpicking and raking by mechanical means, providing law enforcement; beach nourishment projects; beach/dune system education; beach/dune protection and restoration projects providing public facilities such as restrooms, showers, and picnic areas; liability insurance; and personnel necessary to provide beach-related services. Beach-related services and facilities shall serve only those areas on or immediately adjacent to the public beaches.

All funds including surplus funds derived by Cameron County from the Beach User Fee program shall be used at a minimum for the following purpose:

1. all costs associated with administering the requirements of the Open Beaches Act and 31TAC §15.8; Beach User Fees
2. the provision, construction, maintenance, replacement and repair of:
 - a) sanitary facilities on the beach provided for the use and convenience of the public,
 - b) on and off beach parking facilities,
 - c) traffic control or road signs, devices or structures on the beach, and sand dunes and dune vegetation,
 - d) the cleaning and maintenance of the public beach,
 - e) public safety on the beach, and
 - f) all costs directly related to the management of the beach.

Administrative Cost and Accounting

The following methods shall be used for administering beach user fee accounting:

1. No more than 10% of beach user fee revenues shall be expended in one fiscal year on reasonable administrative costs related to beach-related services.
2. Revenue/Expenditure Accounting. Cameron County will establish a separate “fund” in the Cameron County Park System budget for all

expense of revenue activities occurring on county beaches outside of county parks (i.e., at beach user fee stations, beach patrol areas, etc.) Revenues will be maintained and accounted for separately and not commingled with any other funds so that fee collections may be directly traced to expenditures on beach related services.

3. Beach user fee revenues shall be maintained and documented individually for each beach user fee and account balances and expenditures shall be documented according to general accepted accounting principles.
4. Annual operating and capital budgets will be established based on anticipated revenues and any excess revenues at year-end will be credited to the following year's operating and capital budgets. Along with Park System audits, an independent audit of this fund will be conducted annually; the results of any audit relevant to beach user fee (BUF) revenues shall be submitted to the Texas General Land Office. Cameron County will send quarterly reports to the Texas General Land Office on the amount of beach user fee revenues collected and itemizing how beach user fee revenues are expended.

Beach User Fee / Beach Access

In order to establish and a maintain quality beach-related services and facilities for the preservations and enhancement of access, to and from and safe and healthy use of beaches by the public, the fee schedule recommended is detailed on section Beach User Fee Schedule on page 14. These provisions are consistent with the Beach and Dunes Rules of 31 TAC 15.8.

Supplemental revenue sources may be considered in addition to the beach user fee to fund the expanded services and management of public beaches. These may include, but are not limited to, parking meter revenues, "bed tax" revenues, State Beach Maintenance Reimbursement funds and potential beach commodity concessionaires.

In Cameron County, Public Beach related amenities are maintained for the enjoyment of the visitors, which in the unincorporated areas of the County, there are 7 public county maintained beach access points along the Gulf of Mexico. Three of the existing beach access points to Cameron County beaches will allow public vehicular access and are identified as **Access Point Number 7-Boca Chica Beach, Access Point Number 5,** and **Access Point Number 6.**

Furthermore, four other access points restrict vehicular access on public beaches, but provide pedestrian access and public parking and are identified as **Access Point Number 1-Isla Blanca Park; Access Point Number 2-Andy Bowie Park; Access Point Number 3-0.3 miles north of Andy Bowie Park; and Access Point Number 4 (East & West) (Free**

Access-Beach Pocket Park), one-mile north of Andy Bowie Park.

“Free Access-Beach Pocket Parks” Drive on access will be afforded and controlled, as financially feasible, at three designated access points. Vehicular or pedestrian beach access at other points across private lands, particularly that which may result in public trespassing, dune destruction, decreased flood protection and unregulated vehicular activities will be discouraged in accordance with State Statutes while encouraging beach access at official beach access points. Cameron County shall maintain some free public beach access, providing access areas where no fee is charged for parking. These areas are currently identified as: Access Point Number Seven (7), Boca Chica Beach; Access Point Number Four (4) (East and West), Access Point Number Five (5) West and seasonal free beach access at Access Point Number Three (3) and Six (6).

Isla Blanca Park (Beach Access 1) located at the most southern tip of South Padre Island, is not a beach vehicular accessible point, but allows public accessibility to approximately 1 mile stretch of beach with all-weather roads with approximately 933 public parking spaces including designated handicapped parking. A beach user fee for amenities is charged at this park. Facilities provided at this park or access point number one (1) are R.V. accommodations with and without utilities, plus other recreational facilities such as; (7) public restrooms, showers, picnic and bar-b-que areas, two (2) covered pavilions with food and clothing concessions, gulf and bay fishing, playground areas, educational aquatic center, restaurants, seasonal lifeguards/beach patrol, and police surveillance. On average 189,000 passenger cars and motorcycles (based on data from 2016-2017), and 140 buses visit this park or beach access annually.



Andy Bowie Park (Beach Access 2) located just north of the Town limits of South Padre Island is not a beach vehicular accessible point, but allows public accessibility to approximately 1 mile of beach with all-weather roads with approximately 301 public parking spaces, including designated handicapped parking. A beach user fee for amenities is charged at this park. Andy Bowie Park facilities provided at this park or Access Point Number 2 are: two (2)



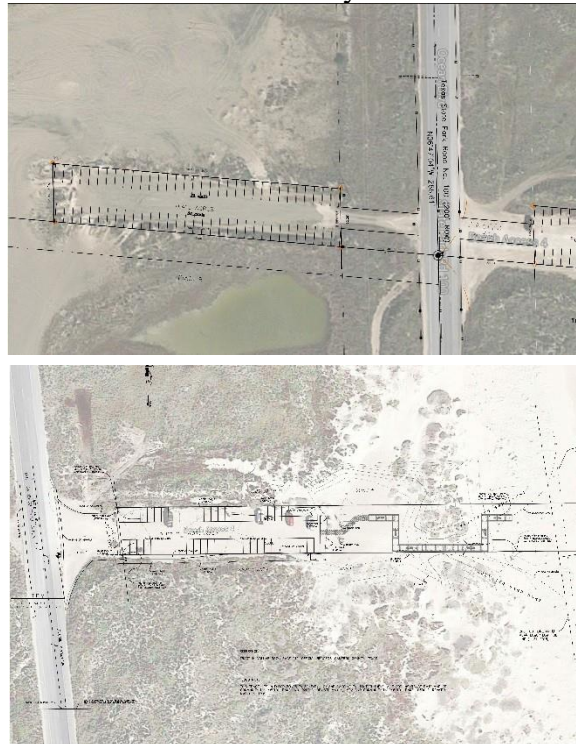
public restrooms with showers, picnic/bar-b-que areas, two (2) covered pavilions with picnic tables, playground area, a Park Ranger Station, nature trail, seasonal lifeguards/beach patrol, and police surveillance. On average 20,350 passenger cars and motorcycles (based on data from 2016-2017), and 10 buses visit this park or beach access annually.

Beach Access Number 3 is located 0.3 miles north of Andy Bowie Park- Beach Access 2. This is not a vehicular accessible point, but allows public access to the beach. This access area provides 142 public parking spaces and a dune walkover that allows public access to the beach, police surveillance, seasonal lifeguards/ beach patrol and portable restrooms. Additional amenities, restrooms, rinse stations and covered pavilions will be constructed in the future. Free access is provided during non-peak season, which is immediately after Labor Day through the last day of February. The rest of the year a BUF is enforced.



Beach Access Number 4 is located 1-mile north of Andy Bowie Park.

This is not a vehicular accessible point, but allows free public accessibility to the beach. This access area provides 54 (49 regular and 5 ADA accessible) public Gulf side parking spaces and an ADA accessible dune walkover that allows access to the beach and 66 spaces on the west side of Park Road 100, police surveillance, seasonal lifeguards/beach patrol and portable restrooms.



E.K. Atwood Park (Beach Access Number 5): located approximately

1.6 miles north of Andy Bowie Park and being a beach user fee-based vehicular beach accessible point, but allows public accessibility to this beach access through all-weather roads with approximately 128 public Gulf side



parking spaces, including 5 ADA parking spaces, and 4 food truck parking concession spaces; and 58 spaces on the west side of Park Road 100. Facilities provided at this park or access point number five (5) are: public restrooms, five (5) large covered pavilions with picnic tables, community rinse stations, restrooms, two ADA accessible dune walkovers, police surveillance and seasonal lifeguards/beach patrol.

***Free parking is provided directly across this park on the bay side (West) of Park Road 100.** Based on data from 2015-2016 on average 100,000 passenger cars and motorcycles, and 10 buses visit this park and beach access each year.

Beach Access Number 6: Located approximately 4.6 miles north of Andy Bowie Park, this access point provides seasonal maintained access to the beach and a seasonal BUF. The County Parks Department provides vehicular beach access through Access Point Number Six (6) located 4.5 miles north of Andy Bowie Park which provides only seasonal roadway maintenance and staffing for public safety, security and emergency purposes. Free vehicular access is provided during non-peak season, which is immediately after Labor Day through the last day of February. The rest of the year a BUF is enforced. Based on data from 2016-2017, on average 24,000 passenger cars and motorcycles, and 10 buses visit this access point per year.



Beach Access Number 7: known as Boca Chica Beach, is located 18 miles east of the City of Brownsville. This access point is a free, vehicular access point that provides public accessibility to the beach through an all-weather road.

Beach User Fee Consistency with TAC \$15.8

Cameron County continues to maintain adequate and safe beach access for the public which is subsidized through the collection of Beach User Fees. The fees collected at access points support expenditures associated with enhanced beach management practices such as:

- 1) The Cameron County Beach Patrol (CCBP) is the designated lifeguard service for the Cameron County Parks system. The CCBP is certified by the United States Lifesaving Association, America's premier nonprofit, professional association for beach lifeguards and open water rescuers. The CCBP hires over 40 people comprised of Lifeguards, Senior Lifeguards, Supervisors and Dispatchers. The mission of CCBP is to protect the 3.5 million people who visit county beaches each year, respond to aquatic emergencies, educate the public about beach safety, and be a good community partner.
- 2) Staffing of the booths by trained personnel with the ability and intent to communicate clearly to occupants of all vehicles; a definition, consistent with State Statutes of the limits or boundaries of public beach and private land, the fragile nature of the beach/dune system including flora and fauna; proper safety

and driving practices appropriate for the beach; and the ordinance of Cameron County which prohibits littering or glass bottles on the public beaches.

- 2) Expanded Beach Cleaning: Activities to include hand collection of litter as well as beach raking, and litter barrel collection.
- 3) Increased Law Enforcement: Patrol by Park Rangers units for the unincorporated beaches on South Padre Island.
- 4) Improved Public Sanitation: By provisions of port-a-potties at reasonable intervals along public drive-on beaches on South Padre Island.
- 5) Increased Traffic Regulation: With improved signage and provision of temporary traffic barriers that direct traffic to specific designated driving portions of the beach.
- 6) Beach Access Maintenance: For improvement and general maintenance of official beach access points providing periodic clearing of loose sand to allow passage of vehicular traffic.
- 7) Public Beach Amenities: Community rinse stations, picnic pavilions, dune walkovers, restrooms, showers, parking areas and concession stands and showers.

The proposed increases in fees are necessary to address several issues and problems that continually emerge year after year associated with beach related services such as the struggle of dealing with the excessive, unsightly and unsanitary accumulation of trash on the beaches and the ability to ensure the public restrooms are clean, safe and in order. We recognize that these two issues are serious and may pose a public health and safety risk. As a result, Cameron County proposes to implement several abatement initiatives such as:

1. Creating a separate seasonal or permanent crew that will strictly be situated at E.K Atwood Park to service the new amenities which will address the litter problem, the trash receptacles, the maintenance of the accesses and the parking lots.
2. Purchasing equipment strictly to maintain the new amenities at E.K. Atwood Park.
3. Purchasing of new maintenance equipment to replace the existing assets.
4. Creating a separate seasonal or permanent crew that will strictly be situated at Isla Blanca Park to service the new amenities which will address the litter problem, the trash receptacles, the maintenance of the accesses, beach boardwalk and the parking lots.
5. Extending the Beach Patrol services at E.K. Atwood Park and Isla Blanca Park.

Beach User Fee Schedule

<i>Isla Blanca Park</i>	<i>Passenger Vehicle (\$15.00)</i> <i>Motorcycles (\$15.00)</i> <i>Buses (\$30.00)</i> <i>Bicycles & Pedestrian - No Charge</i>
<i>Andy Bowie Park (Beach Access 2)</i>	<i>Passenger Vehicle (\$15.00)</i> <i>Motorcycles (\$15.00)</i> <i>Buses (\$30.00)</i> <i>Bicycles & Pedestrian - No Charge</i>
<i>Beach Access 3 (seasonal)</i>	<i>Passenger Vehicle (\$15.00)</i> <i>Motorcycles (\$15.00)</i> <i>Buses (\$30.00)</i> <i>Bicycles & Pedestrian - No Charge</i>
<i>E.K. Atwood Park (Beach Access 5)</i>	<i>Passenger Vehicle (\$15.00)</i> <i>Motorcycles (\$15.00)</i> <i>Bicycles & Pedestrians - No Charge</i>
<i>Beach Access 6 (seasonal)</i>	<i>Passenger Vehicle (15.00)</i> <i>Motorcycles (\$15.00)</i> <i>Buses (\$30.00)</i> <i>Bicycles & Pedestrians - No Charge</i>
<i>Passes</i>	<i>Annual (system-wide) - (\$100.00)</i> <i>30-day- (\$35.00)</i>
<i>Veterans Pass</i>	<i>50% off all passes with proof of mobilization/activation to active duty.</i>

Vehicle operation will be specifically prohibited in or on dunes within 1,000 feet of mean high tide (MHT), and beach users entering the public beach via check stations will be informed of this prohibition.

The BUF will not unfairly limit access. Two out of 7 of the beach access points (Boca Chica Beach and Beach Access #4) have no fee throughout the year and two additional access points have no fee during the off-season (Beach Access #3, and #6). All the beach access points have free entrance for pedestrians and cyclists. In addition, the beach user fee is per vehicle entering the park and not per person. There is no restriction on the amount of people per vehicle.

Trash Refund Program

This program will operate during our season's busiest time, March 1st thru Labor Day. Included in the general Beach User Fee, Cameron County Park staff will collect \$5.00 for a trash bag deposit for every vehicle entering only at County Beach Accesses 5 & 6, and then an empty trash bag will be provided with an attached receipt. As the visitors exit the beach, County staff will refund \$5.00 in return for their receipt and the County issued bag full of trash. The refund will only be issued for that same day, if the bag is full and if they return before 7:00 p.m. The total BUF fee charged, including the \$5.00 Trash Bag Fee, will not exceed the daily entrance fees approved in this plan.

This program is intended to help keep the beaches clean by addressing the negative impacts of domestic trash left behind by visitors of county beaches, plus it serves as a tool to educating the public about the unsanitary environment and the detriment to human and marine life created by leaving trash behind.

Funds generated from this program will allow the Cameron County Parks Department to support expenditures associated with enhanced beach management practices such as:

1. Hiring Seasonal Employees on the north end of the Island for collecting entry fees, collection of trash bags, refunding deposits, addressing litter on the beach, assisting with maintaining access areas, shoreline, parking lots, and amenities; and
2. Hire Seasonal Code Enforcers to specifically address the litter, glass bottle and park policy violations that arise on the County beaches; and
3. Purchasing of Supplies such as trash bags, daily passes, refund receipts, uniforms, storage shed, safety supplies, beach advisory signs, flag advisory signs, traffic signs, and litter control signs; and
4. Paying for garbage and sewer services such as trash containers, trash receptacles, and port-a-potties; and
5. Purchasing equipment strictly for the north end of the Island for law enforcement, toll collection system, maintenance of beaches and amenities.

E. PEDESTRIAN BEACHES

Subject to prior approval pursuant to §61.022, TEXAS NATURAL RESOURCE CODE, beach access may be closed to vehicles. Prior to imposing such restrictions, the County shall acquire and develop new off beach parking areas that will then enable restriction of vehicle use from public beaches without impairing public beach access. In the case of unincorporated areas of Cameron County, this vehicular restriction will extend south of the most northern parking lot, and will afford a continuous pedestrian public beach, uninterrupted by vehicular sections. The County shall avoid a patchwork of pedestrian and vehicular beaches.

The following public parks shall be maintained as public pedestrian access ways to

and from the public beach: Isla Blanca County Park, Andy Bowie County Park, Edwin King Atwood County Park, and Access Points number three (3) and four (4). These parks also provide off beach parking for public beach access.

1. **Off - Beach Parking:** The County shall endeavor to acquire and operate a series of off beach parking lots that afford direct pedestrian access to Gulf Coast beaches in the unincorporated areas of Cameron County. Provisions of adequately compliant sized parking lots, located at appropriate intervals, shall be required prior to the restriction of vehicular use of beaches east of the parking lot and on adjacent lands, generally lying to the south of the parking lot. Parking lots shall be located in wash-over areas, at a frequency not greater than one-half of a mile from the next nearest designated off beach parking lot.

Upon Cameron County planning for adequate parking or public access to the beaches where vehicular access is restricted, it was determined that it was impractical to provide public access while protecting the existing dune system. It was also determined that it was impossible to provide parking every ½ mile from one another along Park Road 100 because of the existing geographic characteristics making it unfeasible by weakening and destroying significantly critical dunes. Therefore, Cameron County has attempted to overcompensate by providing 88 more parking spaces than required for the amount of linear footage closed to vehicles.

Public off-beach parking shall be provided in each parking lot at a quantity sufficient to achieve the requirement of one parking space for every fifteen (15) linear feet of beach that is closed to vehicular traffic.

dSigns shall be posted which conspicuously explain the nature and extent of vehicular controls, parking, and access points. Cameron County will design and use standardized requirements for specific parking spaces and the proper ratio of Handicapped vehicle spaces compared to the number of regular spaces.

Standardized Parking Dimensions

90° angle space: 9' x 19' with a 22' backup (driveway) space
0° (parallel) space: 9' x 23' with a 12' backup (driveway) space

Cameron County will make every effort to assure that logical sites are designated for parking or for vehicular access points without impacting existing dunes. Cameron County will identify locations such as washout areas or publicly dedicated right-of-ways that have already been dedicated through subdivision platting. Vehicle operation will be specifically prohibited in or on dunes and beach users entering the public beach via check stations will be informed of this prohibition. Cameron County will

when feasible create public access areas constructed of all-weather material.

2. **Pocket Parks:** In some instances, a sufficient quantity of land may be acquired to accommodate construction of a public park, with off beach parking in accordance with state statutes and rules.
3. **Land Acquisition of Public Parking Lots:**
 - a) Donation: A private landowner may petition Cameron County to restrict vehicular operation on a particular section of beach, provided that the landowner donates a sufficient quantity of land to meet the requirements found in 31 TAC 15.7 (h). After proper review by appropriate state agencies, conducting the required public hearing, receiving comment from interested agencies or citizens, and obtaining certification from the General Land Office that the activities are consistent with state law as part of the Plan amendment process, Cameron County may elect to accept land donation for public beach access purposes. It is the intent of Cameron County, except in unusual cases, to acquire land for public parking and recreational applications by voluntary donation, rather than by fee simple purchase.
 - b) Purchase: Alternately, Cameron County may initiate closure of a beach portion to vehicular traffic by acquisition through negotiation and purchase, or condemnation, and Cameron County will adhere to the same requirements discussed above.
 - c) Public Use Preserved in Perpetuity: The County shall not abandon, relinquish, or convey any right, title, easement, right-of-way, street, path, or other interest that provides existing or potential beach access or parking area, unless an equivalent or better beach access or parking area is first provided consistent with this ordinance.
 - d) Interfering with Access Prohibited: No person shall create, erect, construct or maintain any obstruction, barrier, signs, or restraint on or within a public beach, which will interfere with the free and unrestricted right of the public to use any public beach, or imply private ownership.
4. **Emergency Beach Closures:** Any peace officer, through the authority of the Chief Park Ranger or his designee, in any extraordinary emergency may close areas of the public beach to protect public safety and/or property. The County Judge shall limit the closure to the smallest possible area and the shortest possible time necessary. The GLO will be notified upon the time of closure and upon the time of reopening of the beach.

F. TEMPORARY BEACH CLOSURE FOR SPACE FLIGHT ACTIVITIES

1. Pursuant to the provisions of Chapter 61, Texas Natural Resources Code: to protect public health, safety, and welfare the Cameron County Commissioners Court by order may temporarily close a beach in reasonable proximity to a space flight launch site or access points to the beach in the county on a primary or backup launch date, subject to Subsection 2.

2. The Commissioners Court may not close a beach or access points to the beach on a primary launch date consisting of any of the following days without the approval of the Land Office:

- (1) the Saturday or Sunday preceding Memorial Day;
- (2) Memorial Day;
- (3) July 4;
- (4) Labor Day; or
- (5) a Saturday or Sunday that is after Memorial Day but before Labor Day.

3. The Cameron County Commissioners Court and the General Land Office shall enter into a memorandum of agreement to implement the provisions of Chapter 61, Texas Natural Resources Code and the provisions of this section.

III. DUNE PROTECTION IN UNINCORPORATED AREAS

A. Cameron County Dune Protection Committee: The Cameron County Commissioners Court shall appoint five (5) county residents to serve a term established by Commissioners' Court of not less than two (2) years, and not more than four (4) years. In selecting members, the Commissioners Court shall attempt to balance the following interests: environmental conservation, technical or legal expertise, land owners or developers, the public recreationist, and other local, governmental jurisdictions affected by proximity to public beaches. The committee's function is to review and make recommendations to Cameron County Commissioners Court on all Beachfront Construction Certificates, Dune Protection Permits, and Exemption Petition requests presented to the committee. The committee shall meet on an as needed basis. All committee meetings shall be called and conducted in compliance with the Texas Open Meetings Act.

It shall be the responsibility of the committee to review permit and exemption applications, physically inspect proposed project sites by at least three (3) committee members, and recommend approval (with conditions, if appropriate), or denial of a permit or certificate.

B. Dune Protection Line Established: In accordance with Texas Natural Resource Code § 63.012, Cameron County hereby establishes a Dune Protection Line in all unincorporated coastal areas parallel to the seaward shoreline of the Gulf of Mexico. That line is based on the mean high tide line of the Gulf of Mexico, and; is a line lying parallel to and not further

landward than one thousand (1,000) feet west of the mean high tide line and generally runs in a North-South direction. Cameron County or a permit applicant (at the County's discretion) shall provide the Texas State plane coordinates for locating the Dune Protection line as funds and/or resources allow. The Dune Protection line is a 'moving' line changing with shoreline changes and subject to modification that may be necessitated by future State or Federal regulatory and statutory changes. The Commissioners Court shall review the location of the Dune Protection Line and beachfront construction line at least once every five years to determine whether the lines are adequately located to achieve their stated purposes. In addition, the Commissioners Court shall review the adequacy of the location of the lines within 90-days after a tropical storm or hurricane affects the portion of the coast lying within the County's jurisdiction. The Commissioners Court shall amend this Order to adjust the lines whenever necessary to achieve their stated purposes.

Any construction activity proposed east of the Dune Protection Line, or any activity covered by Chapter 63, Texas Natural Resources Code that could directly or indirectly cause destruction or damage to sand dune vegetation, is subject to permit and certificate requirements by Cameron County. A party must obtain a permit prior to commencing any such activity. Failure to acquire a permit prior to any construction activity east of the Dune Protection Line constitutes separate violations of State Statutes and Cameron County Commissioners Court Order 1994. Cumulative penalties may be assessed against a party in violation of the Open Beaches Act, the Dune Protection Act, Order 1994, or Texas General Land Office rules (31 TAC 15.1 - 15.10).

- C. Dune Protection Permits are hereby required for any activity which may result in the damage or destruction of dunes and dune vegetation seaward of the Dune Protection Line or written in the critical dune area (TNRC 63.051). The review process for Dune Protection Permits shall be coordinated with the Texas General Land Office to allow sufficient time for the Texas General Land Office to conduct a field inspection, if necessary, of not more than ten (10) business days for small-scale construction or thirty (30) business days for large-scale construction. A copy of the permit application, including the Exemption Petition, if applicable, and the applicant's hearing notice shall be sent to the Texas General Land Office at least ten or thirty working days prior to the public hearing on the application. The County Engineer and/or Parks Director will be responsible for sending all correspondence related to permit applications to the GLO. The application shall be reviewed by the Cameron County Engineer and/or the Parks Director within the 15 business day period following submission of the application. If all the required information is contained within the submission, the application shall be forwarded to the General Land Office for their review. The County will provide the GLO with an assessment of the permit application's consistency with the

County's Dune Protection and Beach Access Plan and ERP. If the application is incomplete, the County Engineer and/or the Parks Director shall make note of such requirements in letters to the applicant within 15 business days of the date of the application or resubmittal. The County's Dune Protection Committee and Commissioners Court shall review, consider, and include in the record a description of the proposed construction and the comments received from the Texas General Land Office. Unless impractical, Cameron County shall issue the Dune Protection Permit and the Beachfront Construction Certificate concurrently. The requirements of this plan apply to applications for subdivision plat approval, applications for a building permit, a site plan approval, and zoning approval. The application fee for a Dune Protection Permit or Beachfront Construction Certificate is \$500.00, and shall be tendered at time of filing an application to the Cameron County Engineering Department and/or Parks Department.

The Cameron County Dune Protection Committee shall make a recommendation to Commissioners Court within six (6) weeks of the date that the Committee receives the application. Based on the record established by the Dune Protection Committee and any new relevant information the Court adds to the record, the Court shall either grant or deny a permit or Certificate within six (6) weeks of receiving a Committee recommendation. A permit or certificate may include any conditions necessary to assure adequate public beach access and use rights, the preservation and enhancement of dunes and dune vegetation and protection from potential flood damage. The County shall issue Dune Protection Permits or Beachfront Construction Certificates only under circumstances and conditions consistent with this plan, the Erosion Response Plan, Texas General Land Office rules, and FEMA's regulations. The Court shall consider the different laws which affect the decision-making process and shall take these laws into account when deciding to issue Dune Protection Permits and Beachfront Construction Certificates. A Dune Protection Permit shall be granted to an applicant if Commissioners Court finds that:

1. the proposed activity is not a prohibited activity as defined in Subsection G.2. of this section (Prohibited Activities);
2. The proposed activity will not materially weaken dune complexes or materially damage dune vegetation within dune complexes seaward of the dune protection line based on substantive findings under Subsection III d of this section (Material Weakening);
3. There are no practicable alternatives to the proposed activity and adverse effects cannot be avoided as provided in Section III D of this section (Mitigation of Adverse Effects);
4. The applicant's mitigation plan will adequately minimize, mitigate, and/or compensate for any unavoidable adverse effects, as provided in Section III D of this section (Mitigation of Adverse Effects); and

5. Where mitigation is required, that the applicant has provided landowners immediately adjacent to the tract with notice of the hearing at least 10 days prior to the hearing on the application.
6. The proposed activity complies with any applicable requirements (beachfront construction certificates, dune protection permits, exemption petitions and management of the public beach) of this order.
7. If the application includes an exemption petition, the petition meets the requirements of Section 5.3 of the Erosion Response Plan and the Commission has made findings as required under Section 5.3.2 of the Erosion Response Plan (See Appendix A).

Compliance with local, state, and federal laws is necessary for consistent management within Cameron County. The Commissioners Court shall not issue a permit or certificate that is inconsistent with this order, the Texas General Land Office rules for management of the beach/dune system 31 TAC §§15.1-15.10, TEXAS OPEN BEACHES ACT, TEXAS DUNE PROTECTION ACT, or FEDERAL EMERGENCY MANAGEMENT AGENCY REGULATIONS, the requirements of which are incorporated into this order by reference.

D. The Mitigation Sequence

Cameron County will maintain a Dune Protection Line which, at a minimum, protects the fore dune ridge and all dunes seaward of the fore dune ridge. Although fore dunes and the fore dune ridge are the primary focus of protection, they depend on the backdunes for support and preservation. Damage and destruction to fore dunes, or to back dunes which would materially weaken fore dunes and the fore dune ridge shall be avoided using the best available technology. Dune damage includes any manmade alteration of a dune or dune vegetation that individually or cumulatively with other actions is likely to materially weaken the beach/dune system by reducing its effectiveness as habitat for flora and fauna, protection from potential flood damage, and protection from erosion.

It is specifically provided that the Commissioners Court shall balance the objective of protecting the beach/dune system with recognizing landowners' rights to reasonable use of private property. Accordingly, the Court shall require the use of the mitigation sequence to redress any injury to dunes and dune vegetation if landowners, after exhausting appropriate efforts to avoid damaging dunes and dune vegetation, demonstrate to the court that disturbance to dunes or dune vegetation is unavoidable.

The mitigation sequence required by the Court consists of the following four (4) steps.

1. Avoidance. Avoidance means avoiding adverse effects altogether by not taking a certain action or parts of an action. The Commissioners Court shall not issue a permit allowing any adverse effects on dunes or dune vegetation

seaward of the Dune Protection Line unless the applicant proves there is no practicable alternative to the proposed activity, proposed site, or proposed methods for conducting the activity (specifically roads parallel to the beach, non-exempt pipelines, artificial channels, or cause any such adverse effects for which the Commissioners Court determines there is a practicable alternative that would avoid adverse effects).

2. Minimize. Minimize damage to dunes and dune vegetation. If an applicant for a Dune Protection Permit or Beachfront Construction Certificate proves to the County that damage to dunes and/or dune vegetation is unavoidable, the Court may issue a permit or certificate allowing the unavoidable damage provided that there is a permit or certificate condition requiring that the damage shall be minimized to the greatest extent practicable.
3. Mitigation.
 - a) Mitigation means repairing, rehabilitating, restoring affected dunes and dune vegetation. Where adverse effects on dunes and dune vegetation cannot be avoided or minimized, the county shall set appropriate permit conditions requiring that permittees repair, rehabilitate, or restore affected dunes to the same volume as the pre-existing dunes and dune vegetation so that they will be superior or equal to the pre-existing dunes in their ability to protect adjacent public and private property from potential flood damage, nuisance, and erosion and to protect natural resources.
 - b) Permittees may mitigate adverse effects on dunes using vegetative or mechanical means. Permittees shall:
 - 1) Restore dunes to approximate the naturally formed dune position or location, contour, volume, elevation, vegetative cover, and sediment content in the area;
 - 2) Allow for the natural dynamics and migration of dunes;
 - 3) Use temporary sand fences or a county approved method of dune restoration, where appropriate, considering the characteristics of the site; and
 - 4) Restore or repair dunes using indigenous vegetation that will achieve the same protective capability as or greater capability than the surrounding natural dunes.
 - c) In authorizing or requiring restoration of dunes, the county shall give priority to stabilization of blowouts and breaches. Before permitting stabilization of wash over areas, the Commissioners Court shall:
 - 1) Assess the overall impact of the project on the beach/dune system;
 - 2) consider any adverse effects on hydrology and drainage which will result from the project; and
 - 3) require that equal or better public beach access be provided to compensate for impairment of any public beach access previously provided by the wash over area.

4. Compensate means the replacement of any dune or dune vegetation lost to construction activities. Landowners shall compensate for unavoidable damage to dunes and dune vegetation by the creation of new dunes, the enhancement of existing dunes, and/or the repair of the damaged dunes as well as the planting of indigenous vegetation. The new, enhanced, and/or repaired dunes shall be superior or equal to the damaged dunes in their ability to protect the community from potential flood damage, to provide habitat for indigenous flora and fauna, and to protect the adjacent beach from erosion.

The permittee shall begin compensation for damage to dunes or dune vegetation no later than 30 days after construction is complete. Compensation efforts shall be continuous until the new, enhanced and/or repaired dunes and dune vegetation are superior or equal to the damaged dunes and dune vegetation. However, in no event shall the compensation process take more than three years. After three years, if compensation is incomplete the permittee shall be liable for penalties under the Dune Protection Act and the Open Beaches Act.

The Court will not issue a Dune Protection Permit which allows any construction of restored dunes created on the public beach, except for dune walkovers or other walkways that serve only as access ways and encroach on the public beach to the minimum extent possible.

On-site compensation consists of replacing or restoring the affected dunes or dune vegetation on the site where the dunes and dune vegetation were originally located. Permittees shall locate compensation work on the construction site, where practicable. A permittee may locate compensation efforts off the construction site if the permittee demonstrates that: on-site compensation is not practicable; the off-site compensation will be located as close to the construction site as practicable; the off-site compensation has achieved a 1:1 ratio of proposed adverse effects on successful, completed and stabilized restoration prior to beginning construction; and the permittee has notified FEMA, Region 6, of the proposed off-site compensation.

- a) Permittees shall provide the following information when proposing off-site compensation:
 - 1) the name, address, phone number, and fax number, if applicable, of the owner of the property where the off-site compensation will be located;
 - 2) a legal description of property intended to be used for the proposed off-site compensation;
 - 3) the source of the sand and dune vegetation to be used;
 - 4) all information regarding permits and certificates issued for the restoration of dunes on the compensation site;
 - 5) all relevant information regarding the success, current status, and

- 6) stabilization of the dune restoration efforts on the compensation site; any increase in potential flood damage to the site where the adverse effects on dunes and dune vegetation will occur and to the public and private property adjacent to that site; and
- 7) the proposed date of initiation of the compensation.
- b) Permittees shall compensate for adverse effects on dune vegetation by planting indigenous vegetation on the affected dunes. Permittees may not remove existing vegetation from property not owned by the permittee unless the permittee includes in the permit application written permission from the property owner. The permit application must identify the source of any sand and vegetation which will be used in compensation.
- c) Permittees shall begin compensation prior to or concurrently with the commencement of construction. If compensation is not to be completed prior to commencement of construction, the permittee shall provide proof of financial responsibility in an amount necessary to complete the compensation, in the form of an irrevocable letter of credit, performance bond, or any other instrument acceptable to the county.
- d) Permittees shall notify the Cameron County Engineer and/or Parks Director in writing of the actual date of initiation within ten (10) working days after compensation is initiated. If the permittee fails to begin compensation on the date proposed in the application, the permittee shall state the reason for the delay. The County shall take this reason into account when determining whether a permittee has violated the compensation deadline.
- e) Permittees shall conduct compensation efforts continuously until the repaired, rehabilitated, and restored dunes and dune vegetation are equal or superior to the pre-existing dunes and dune vegetation. These efforts shall include preservation and maintenance pending completion of compensation.
- f) A compensation project is deemed complete when the position, contour, volume, elevation, and vegetative cover of the restored dunes have reached a level that matches or exceeds the pre-existing dunes.
- g) The County Engineer and/or Parks Director shall provide written notification to the General Land Office upon determining that the compensation is complete. If the County Engineer and/or Parks Director does not receive an objection from the General Land Office regarding the completion of compensation within thirty (30) working days after the General Land Office is notified in writing, the County Engineer and/or Parks Director or his designee may certify to the permittee that the compensation is complete.
- h) The permittee shall be deemed to have failed to achieve compensation if a 1:1 ratio has not been achieved within three years after the beginning of compensation efforts.

E. PERMIT ADMINISTRATION

1. Terms and renewal of permits/ certificates.
 - a) Permits or certificates shall be valid for three years from the date of issuance.
 - b) The Commissioners Court may renew a permit or certificate for two (2) consecutive ninety day periods thereafter if the activity as proposed in the application for renewal complies with this order and the permittee supplements the original application materials with additional information indicating any changes to the activity or information. The Commissioners Court shall issue only two renewals for each permit or certificate. Thereafter, the permittee must apply for a new permit or certificate.
2. Termination of permits/certificates.
 - a) The Commissioners Court may void a permit or certificate if:
 - 1) a material change occurs after the permit or certificate is issued; or
 - 2) a permittee fails to disclose any material fact in the application.
 - 3) the permit or certificate is inconsistent with this order or with the General Land Office rules for management of the beach/dune system at the time of issuance.
 - b) "Material change" includes human or natural conditions which have adversely affected dunes, dune vegetation, or beach access and use that either did not exist at the time of the original application, or were not considered by the County in making the permitting decision because the permittee did not provide information regarding the site condition in the original application.
 - c) A permit or certificate automatically terminates if construction comes to lie within the boundaries of the public beach by artificial means or by natural causes.
3. Administrative record.

The administrative record of official Commissioners Court actions relative to permit and certificate applications shall be maintained within the minutes of the Commissioners Court by the County Clerk as consistent with state law. The County Engineer and/or Parks Director shall keep the files relevant to applications and permitting for dune protection permits.

Cameron County delegated the authority to the City of South Padre Island to develop and implement a dune protection program for implementation within the City's corporate municipal limits only.
4. Issuance or denials of dune protection permit.
 - a) To determine whether to issue or deny a permit, the Commissioners Court or its designee should at least review and consider the following factors:

- 1) the information in the permit application
- 2) the proposed activity's consistency with this order and the General Land Office rules for management of the beach/dune system;
- 3) any other law relevant to dune protection which affects the activity under review;
- 4) the comments of the Dune Protection Committee, the General Land Office, and the general public; and particularly:
 - i) cumulative and indirect effects of the proposed construction on all dunes and dune vegetation seaward of a dune protection line;
 - ii) cumulative and indirect effects of other activities on dunes and dune vegetation located on the proposed construction site;
 - iii) the pre-construction type, height, width, slope, volume, and continuity of the dunes, the pre-construction condition of the dunes, the type of dune vegetation, and percent of vegetative cover on the site;
 - iv) the local historical erosion rate as determined by the University of Texas at Austin, Bureau of Economic Geology, and whether the proposed construction may alter dunes and dune vegetation in a manner that may aggravate erosion;
 - v) all practicable alternatives to the proposed activity, proposed site, or proposed methods of construction;
 - vi) the applicant's mitigation plan for any unavoidable adverse effects on dunes and dune vegetation and the effectiveness, feasibility, and desirability of any proposed dune reconstruction and revegetation;
 - vii) the impacts on the natural drainage patterns of the site and adjacent property;
 - viii) any significant environmental features of the potentially affected dunes and dune vegetation such as their value and function as floral and faunal habitat or any other benefits the dunes and dune vegetation provide to other natural resources;
 - ix) wind and storm patterns including a history of wash over patterns;
 - x) location of the site on the flood insurance rate map;
 - xi) success rates of dune stabilization projects in the area; and
5. Any other information the Commissioners Court considers useful, including resource information made available to them by federal and state natural

resource entities. The Commissioners Court may issue a permit only if it finds as a fact, after a full investigation, that the particular conduct proposed will not have a net effect to materially weaken any dune or materially damage dune vegetation or reduce the effectiveness of any dune as a means of protection against erosion and high wind and water (with or without mitigation).

6. In order to find that there will be no material weakening or damage to dunes or dune vegetation, the Commissioners Court will evaluate proposed projects to ensure that:
 - a) The activity will not result in the potential for increased flood damage to the proposed construction site or adjacent property;
 - b) The activity will not result in runoff or drainage patterns that aggravate erosion on or off the site;
 - c) The activity will not result in significant changes to the natural permeability of a dune or its ability to transmit rainwater to the water table;
 - d) The activity will not disturb unique flora or fauna or result in adverse effects on dune complexes or dune vegetation; and
 - e) The activity will not significantly increase the potential for washovers or blowouts to occur.

7. Beach Special Events Permitting:

At least thirty (30) days prior to any planned special event on the beach, the special events promoter shall file a letter requesting to have a special event on the beach with the Cameron County Parks Director. The Parks Director will prepare a license agreement to be presented to the Cameron County Commissioners Court for approval. The Cameron County Commissioners Court must approve all special events on the beach prior to the commencement of such special event. A license agreement for a special event on the beach is only valid for the specific special event period. A fee will be assessed for any and all special events held on the beach. In addition to any license agreement requirements, any person desiring to set up any type of temporary facility during the special event period on the beach shall:

- a) Provide for sanitary facilities that the Parks Director deems reasonably necessary as a result of the number of people attending the special event;
- b) Provide a detailed plan to the County describing the facilities being set up so that the County and the Texas General Land Office can determine if a beach/dune permit will be required;
- d) Ensure that no outdoor facility or structure be set up that will impair public access to the beach or use of the public beach or would cause any damage or destruction to the dunes and vegetation on the beach; and;

- e) Provide a detailed list of any sale of food, beverages, novelties, souvenirs or other items for Commissioners Court approval.

A copy of the permit issued by the County will be forwarded to the Texas General Land Office for their files no later than five (5) days from the date the County issued the permit.

F. GENERAL CONSIDERATIONS FOR PROTECTED DUNE AREAS

To minimize unavoidable adverse effects as required by Subdivision 3.D. of this section, permittees shall:

1. locate non-exempt pipelines across previously disturbed areas, such as blowout areas, and minimize disturbance of dune surfaces where use of previously disturbed areas is not practicable;
2. minimize construction and pedestrian traffic on or across dune areas to the greatest extent practicable, accounting for trends of dune movement and beach erosion in that area;
 - a) route all pedestrian access to and from beaches through wash over areas or over elevated walkways, and conspicuously mark all such access that is public with permanent signs so indicating;
 - b) consider consolidated private access ways from any proposed subdivision, multiple dwelling, or commercial facility. In some cases, the minimum beach access may be only one access way. In determining the appropriate grouping of access ways, the County shall consider the size and scope of the development;
 - c) the County may consider that the developer post and maintain signs in areas where pedestrians traffic is high explaining the functions of dunes and the importance of vegetation in preserving dunes;
 - d) where practicable, provide vehicular access to and from beaches by sing existing roads, unless public beach access is restricted, and where possible, improve existing access roads possible, improve existing access roads with elevated beams near the beach that prevent channelization of floodwaters;
 - e) where practicable, locate new beach access roads in wash over areas, blowout areas or other areas where dune vegetation has already been disturbed, construct such roads along the natural land contours, and minimize their width;
 - f) where practicable, locate new beach access roads at an oblique angle to the prevailing wind direction;
 - g) prohibit persons from using or parking any motor vehicle on, through, or across dunes outside designated access ways;

- h) maximize use of natural or existing drainage patterns when providing for storm water runoff and retention;
- i) locate and construct new artificial storm water runoff channels and retention basins so as to avoid erosion and unnecessary construction of additional channels and to direct all runoff inland and not to the Gulf of Mexico through dune areas; and
- j) not cause any adverse effects that the Commissioners Court finds can be minimized.

G. SPECIAL PROVISION REGARDING DUNES

1. Alteration of Dunes Prohibited without Permit: The following activities are exempt from the requirement for a permit, but may nevertheless require a beachfront construction certificate or a permit pursuant to other county court orders:
 - a) exploration for and production of oil and gas and reasonable and necessary activities directly related to such exploration and production, including construction and maintenance of production and gathering facilities seaward of the dune protection line which serve wells located outside the dune protection line, provided that such facilities are located no farther than two miles from the well being served;
 - b) grazing livestock and reasonable and necessary activities directly related to grazing; and
 - c) recreational activities other than operation of a recreational vehicle.
2. Prohibited Activities: The Commissioners Court shall not issue a permit authorizing the following actions seaward of the Dune Protection Line (excepting public recreation facilities built within accreting beach areas):
 - a) activities that are likely to result in the temporary or permanent removal of sand from the portion of the beach/dune system located on or adjacent to the construction site, including: moving sand to a location landward of the dune protection line; and temporarily or permanently moving sand off the site, except for purposes of permitted mitigation, compensation, or an approved dune restoration or beach nourishment project and then only from areas where the historical accretion rate is greater than two feet per year, and the project does not cause any adverse effects on the sediment budget;
 - b) depositing sand, soil, sediment, or dredged spoil which contains any of the toxic materials listed in Volume 40 of the Code of Federal Regulations, Part 302.4, in concentrations which are harmful to people, flora, and fauna as determined by applicable, relevant, and appropriate requirements for toxicity standards established by the local, state, and federal governments;

- c) depositing sand, soil, sediment or dredged spoil which is of an unacceptable mineralogy or grain size when compared to the sediments found on the site (this prohibition does not apply to materials related to the installation of maintenance of public beach access roads running generally perpendicular to the public beach);
- d) creating dredged spoil disposal sites, such as levees and weirs, unless an appropriate local, state, and federal permit is obtained;
- e) constructing or operating industrial facilities not in full compliance with all relevant laws and permitting requirements prior to the effective date of this order;
- f) Prohibition of Vehicular Operation in Dunes: Operation of motor vehicles on or in dunes within 1,000 feet of mean high tide is hereby prohibited pursuant to §63.093 of the Natural Resources Code. Vehicle operation on roadways, parking lots, or the roadway portion of the public beach is exempt from this prohibition.
- g) mining dunes;
- h) constructing concrete slabs or other impervious surfaces within 230 feet landward of the natural line of vegetation, except for such a surface that (1) does not extend beyond the perimeter of a habitable structure elevated on pilings, provided that no walls are erected that prohibit the natural transfer of sands, or (2) does not exceed an area equal to the footprint plus 5% of the permitted habitable structure it serves; the use of permeable materials such as brick pavers, limestone, or gravel is recommended when feasible for drives or parking areas;
- i) the placement of a concrete slab may not be structurally attached to the buildings piling foundation in the area within 230 feet of the line of vegetation.
- j) depositing trash, waste, or debris including inert materials such as concrete, stone, and bricks that are not part of the permitted on-site construction;
- k) constructing cisterns, septic tanks, and septic fields seaward of any structure serviced by the cisterns, septic tanks, and septic fields; and
- l) detonating bombs or explosives with the exception of fireworks associated with a holiday or a public event.

H. REVISION OF DUNE PROTECTION COMPONENT OF PLAN

Revision of the dune protection component of the plan shall be initiated by the Cameron County Dune Protection Committee, the County Parks Director and/or the County Engineer. Such revision is subject to approval by the Cameron County Commissioners Court after conducting a public hearing on the proposed revisions, and after review and comment of the proposed revisions by the Texas General Land Office.

I. CONCURRENT REQUIREMENTS FOR BOTH DUNE PROTECTION PERMITS
AND BEACHFRONT CONSTRUCTION CERTIFICATES

Permittees shall:

1. Consider beach erosion rates at proposed development sites, the possibility of the westward movement of the public easement, and potential storm vulnerability when selecting building sites located landward of the building line;
2. Not engage in any construction, which may aggravate erosion;
3. Not construct any new erosion response structure, except a retaining wall located greater than 230 feet landward of the line of vegetation;
4. Not maintain or repair an existing erosion response structure located on the public beach;
5. Not enlarge or improve an existing erosion response structure located less than 230 feet landward of the vegetation line;
6. Not maintain or repair an existing erosion response structure located less than 230 feet landward of the vegetation line that is more than 50% damaged, except: when failure to repair the damaged structure will cause unreasonable hazard to a public building, public road, public water supply, public sewer system, or other public facility immediately landward of the structure; or when failure to repair the damaged structure will cause unreasonable flood hazard to habitable structures because adjacent erosion response structures will channel floodwaters to the habitable structure;
7. Not engage in construction that does not comply with FEMA'S regulations governing construction in flood hazard areas; and
8. Design construction so as to minimize impacts on natural hydrology. Construction shall not cause erosion to adjacent properties, critical dune areas, or the public beach.
9. Consider variances from federal requirements. The Cameron County Engineer and/or Parks Director shall inform the General Land Office and FEMA Region 6 before it issues any variance from FEMA'S regulations found in Volume 44 of the Code of Federal Regulations, Parts 59-77.

J. FLOOD PROTECTION IN COUNTY AREAS

In issuing Dune Protection Permits and Beachfront Construction Certificates, Cameron County shall comply with FEMA's regulations governing construction in flood hazard areas. FEMA prohibits man-made alteration of sand dunes within Zones V1-30, V, and VE on Cameron County's Flood Insurance Rate Map which would increase the potential for flood damage. FEMA also prohibits the use of fill for structural support of buildings within Zones VI-30, V, and VE. Cameron County shall expeditiously inform the General Land Office and the FEMA regional representative in Texas of the issuance of any activity done in variance of FEMA'S regulations. Variances may affect participation in the Federal Flood Insurance Program.

IV. SPECIAL PROVISIONS FOR DEVELOPMENT IN COASTAL AREAS

A. DEVELOPMENT IN ERODING COASTAL AREAS

"Eroding areas" are portions of the shoreline experiencing a historical erosion rate of greater than two feet per year based on published data of the University of Texas at Austin, Bureau of Economic Geology. In addition to the other requirements of this ordinance and the Cameron County Erosion Response Plan, in eroding areas, permittees shall:

1. Elevate all structures on pilings in accordance with FEMA minimum standards or above the natural elevation (whichever is greater);
2. Design structures located on property adjacent to the public beach so that they may be relocated;
3. Be allowed to pave or alter only the ground within the footprint of the habitable structure, (however brick pavers, gravel, crushed limestone or Truegrid pavers may be used to construct driveways) only if the alteration or paving will be entirely undertaken, constructed, and located landward of 230 feet from the line of vegetation; and
4. Be allowed to construct a storage area or areas with breakaway or louvered walls or for enclosures required by local building or safety codes; if consistent with the requirements of National Flood Insurance Program;
5. Be allowed to place unreinforced fibercrete in 4-foot by 4-foot sections, 4 inches thick, separated by expansion joints, beneath the footprint of the habitable structure, not including the area under decks, only if the fibercrete is not structurally attached to the pilings and placement of fibercrete will be entirely undertaken, constructed, and located at least 25 feet from the landward toe of the foredunes. If no dunes exist, placement of fibercrete may only be undertaken, constructed, and located at least 100 feet landward of the line of vegetation, or landward of the building setback line, whichever distance is greater.
6. Construction outside the perimeter of a habitable structure using concrete or other impervious surface with an area that does not exceed 5.0% of the footprint of the habitable structure may be authorized. Concrete curbs may be permitted as part of the 5.0% to preserve the integrity of permeable pavers. Curbs shall not be wider than 6 inches or more than 12 inches high/deep; limited concrete pads may also be permitted as part of the 5.0% if required for utilities, and they should be limited to the minimum dimensions required to meet applicable building codes.

7. Demonstrate and assure financial ability to fund eventual relocation or demolition of the proposed structure.
- B. If there is any conflict between the requirements of this subsection and the requirements of the Erosion Response Plan, the Erosion Response Plan controls.

V. MASTER PLANNED DEVELOPMENTS

- A. "Master planned development" means proposed development for which approval is requested by submission of a comprehensive plan containing maps, drawings, narrative, tables, and other information about the proposed use of specific land and/or water including descriptions of uses and use intensities, building and/or site improvement locations and sizes, relationships between buildings and improvements, vehicular and pedestrian access and circulation systems, parking, utility systems, storm water management and treatment systems, geography, geology, impact assessments, regulatory-approved checklist, and phasing. Information in the master plan may be conceptual or detailed depending on the status of its regulatory approval.
- B. At least 60 days prior to acting on a request for approval of a master planned development within the area subject to this order the County shall send the plan to the General Land Office for review.
- C. When acting on a request for approval of a master planned development, the Commissioners Court shall consider:
 1. The development's potential effects on dunes, dune vegetation, public beach use and access, and the applicant's proposal to mitigate for such effects throughout the construction;
 2. The contents of plan; and
 3. Whether any component of the development, such as installation of roads or utilities, or construction of structures seaward of a dune protection line, will subsequently require a permit or a certificate.
- D. If the Commissioners Court determines that all development contemplated by the plan complies with all requirements of this order, a permit and/or certificate for the development may be issued.
- E. If the Commissioners Court determines that any development contemplated by the plan does not comply with the requirements of this order and therefore cannot be approved without an amendment to this order, the Commissioners Court shall not issue a permit and/or certificate, but shall submit the plan to the General Land Office for approval as an amendment to this order.

VI. STANDARDS FOR BEACH MAINTENANCE AND OTHER ACTIVITIES

1. Beach Maintenance

- A. The Commissioners Court shall not authorize or undertake any beach maintenance or management activities that materially weaken dunes or dune vegetation, reduce the protective functions of dunes, result in significant redistribution of sand, or significantly alter the beach profile. All sand moved or redistributed due to beach maintenance activities of the County shall be returned to a location seaward of the dune protection line. "Beach maintenance" means the cleaning or removal of debris from the beach by handpicking, raking, or mechanical means.
- B. The Commissioners Court authorizes the following beach maintenance and management measures; removal of sand deposits in parking areas, roads, or other public facilities or buildings as necessary to allow continued use and for the construction of government-sponsored restored dune programs using recycled Christmas trees and or other material that is environmentally safe and may easily decompose.
- C. Monitoring: The County may, or at the request of the General Land Office shall, require a permittee to conduct or pay for a monitoring program to study the effects on the public beach of the permittee's coastal and shore protection project, and shall require the permittee to notify the General Land Office and the County of any discernible change in the erosion rate caused by the project.
- D. Beach nourishment standards: The County shall not authorize beach nourishment project unless it finds and the project sponsor demonstrates that:
 - 1. The project is consistent with all applicable requirements of this order;
 - 2. The sediment to be used is of effective grain size, mineralogy, and quality or is the same as the existing beach material;
 - 3. The proposed nourishment material does not contain any toxic materials listed in Volume 40 of the Code of Federal Regulations, Part 302.4, in concentrations which are harmful to people, flora, and fauna as determined by applicable, relevant, and appropriate requirements for toxicity standards established by the local, state, and federal governments;
 - 4. There will be no adverse environmental effects on the property surrounding the area from which the sediment will be taken or on the site of the proposed nourishment;
 - 5. The removal of the sediment will not have any adverse impacts on flora and fauna; and
 - 6. There will be no adverse effects from transporting the nourishment material.

2. DUNE RESTORATION AND CONSTRUCTION OF RESTORED

DUNES

The Commissioners Court may issue a general permit to a government entity, or other public service organization for the construction of restored dunes. Except as otherwise expressly provided in this order, the Commissioners Court shall not authorize restoration of dunes on a public beach unless it finds and the project sponsor demonstrates that the following requirements are met.

- A. The proposed projects:
 - 1. Shall extend no more than twenty feet seaward of the vegetation line and shall follow the natural migration of the vegetation line;
 - 2. Shall not restrict or interfere with public use of the beach at normal high tide.
 - 3. Shall meet the requirements of the Erosion Response Plan.
- B. All restored dunes shall be continuous with any surrounding naturally formed dunes; shall approximate the natural position, contour, volume, elevation, vegetative cover, and sediment content of any naturally formed dunes in the proposed dune restoration area; and shall be planted with indigenous vegetation that will achieve the same protective capability as the surrounding natural dunes.
- C. The following methods or materials may be used to restore dunes:
 - 1. Piles of sand having similar grain size and mineralogy as the surrounding beach;
 - 2. Temporary sand fences conforming to General Land Office guidelines;
 - 3. Organic brushy materials such as used Christmas trees; and
 - 4. Sand or other naturally-occurring organic material obtained by scraping accreting beaches only if the scraping is approved by the local government and the project is monitored to determine any changes that may increase erosion of the public beach.
- D. The following methods or materials shall not be used to restore dunes:
 - 1. Hard or engineered structures;
 - 2. Materials such as bulkheads, riprap, concrete, or asphalt rubble, building construction materials, and any non-biodegradable items;
 - 3. Fine, clayey, or silt sediments;
 - 4. Sediments containing the toxic materials listed in Volume 40 of the Code of Federal Regulations, Part 302.4 In concentrations which are harmful to people, flora, and fauna as determined by applicable, relevant, and appropriate requirements for toxicity standards established by the local, state, and federal governments; and

5. Sand obtained by scraping or grading dunes or the beach, except as part of an approved mitigation plan.
- E. Activities affecting restored dunes shall be subject to the requirements of this order. Permittees shall not construct or maintain private structures on restored dunes, except for dune walkovers or similar access ways meeting the requirements of this order.
- F. All applications or proposals for reconstructing dunes on the public beach shall be forwarded to the General Land Office at least ten (10) working days prior to the decision on the application.

3. **DUNE WALKOVERS.**

The County shall not authorize construction of dune walkovers or other beach access mechanisms unless it finds and the project sponsor demonstrates that the following requirements are met.

- A. The walkover is restricted; to the greatest extend possible, to the most landward point to the public beach.
- B. The walkover is constructed and located in a manner that will not interfere with or otherwise restrict public use of the beach at normal high tides.
- C. Permittees shall relocate walkovers to follow any landward migration of the public beach or seaward migration of dunes using the following procedures and standards.
 1. After a major storm or any other event causing significant landward migration of the landward boundary of the public beach, permittees shall shorten any dune walkovers encroaching on the public beach to the appropriate length for removal of the encroachment.
 2. In cases where a dune walkover needs to be lengthened because of the seaward migration of dunes, the permittees shall apply for a permit or certificate authorizing the modification of the structure.

VII. GENERAL PROVISIONS

1. **PENALTIES.**

Any person who violates either the Dune Protection Act, the Open Beaches Act, this order, or traffic regulation orders or ordinances established by Cameron County Commissioners Court, a permit or certificate condition is liable for a Civil or criminal penalties (in the case of state statutes, not less than \$50 nor more than \$1,000 per violation per day). Each day the

violation occurs or continues constitutes a separate violation. Violation of the Dune Protection Act, the Open Beaches Act, and the rules adopted pursuant to those statutes are separate violations. The assessment of penalties under one act does not preclude another assessment of penalties under the other act for the same act or omission. Conversely, compliance with one statute and the rules adopted there under does not preclude penalties under the other statute and the rules adopted pursuant to that statute. The Commissioners Court shall consider the following mitigating circumstances when referring violations for assessment of penalties: acts of god, war, public riot, or strike; unforeseeable, sudden, and natural occurrences of a violent nature; and willful misconduct by a third party not related to the permittee by employment or contract.

2. CONSTRUCTION.

- A. This order and all orders, resolutions, or other enactments related or pursuant to this order shall be read in harmony with county orders of general applicability. If there is any conflict between them, which cannot be reconciled by ordinary rules or legal interpretation, this order controls.
- B. This order and all orders, resolutions, or other enactments related or pursuant to this order shall be read in harmony with the Open Beaches Act, the Dune Protection Act, and General Land Office rules implementing them. If there is any conflict between them, which cannot be reconciled by ordinary rules of legal interpretation, state law provisions control.

3. BOUNDARY DETERMINATIONS.

The Commissioner of the Texas General Land Office shall make determinations on issues related to the location of the boundary of the public beach and encroachments on the public beach pursuant to the requirements of the Open Beaches Act, Sec. 61.016 and Sec. 61.017. The County shall consult with the General Land Office when questions of encroachment and boundaries arise with respect to the public beach.

4. BEACHES PRESUMED TO BE PUBLIC.

The Commissioners Court shall presume that any beach fronting the Gulf of Mexico is subject to a public easement unless the owner of the adjacent land obtains a declaratory judgment otherwise under the Open Beaches Act, Sec. 61.019. That section provides that any person owning property fronting the Gulf of Mexico whose rights are determined or affected by this order may bring suit for a declaratory judgment against the state to try the

issue or issues.

5. GENERAL PROHIBITION.

No person shall violate any provision of this order or any permit or certificate or the conditions contained therein.

6. APPEALS.

The Dune Protection Act, Sec. 63.151, and the Open Beaches Act Sec. 61.019, contain the provisions for appeals related to this order.

VIII. SUPPLEMENTAL RECOMMENDATIONS

A wide variety of issues were brought to the attention of the Cameron County Coastal Management Committee during the plan development process. Four (4) issues in particular merit mention, and the committee recommends that beyond adopting a dune protection and public beach access, and flood protection plan, Cameron County Commissioners Court take separate action relative to these issues:

A. Beach Nourishment

The Committee recommends that Cameron County in association with the Town of South Padre Island initiate an aggressive beach nourishment program. It is recognized that beaches on the northern portion of South Padre Island are eroding at an alarming rate and posing subsequent threats to properties in the northern portion of the Town of South Padre Island as well as unincorporated areas. The committee recommends that the county and the town work in concert to at least insure that beach-quality (in both grain size and toxicity) dredge materials removed by the U.S. Army Corps of Engineers from the Brazos Santiago Ship Channel are placed directly onto the beaches of South Padre Island.

The County and the Town of South Padre Island should examine additional options to increase the sand budget accruing to beaches of South Padre Island. It is recognized that the dredge materials from the Brazos Santiago Ship Channel alone will not be sufficient to resolve beach erosion problems on South Padre Island.

B. Rezoning of Unincorporated South Padre Island

Cameron County should undertake an effort in cooperation with the town of South Padre Island to update zoning and subdivision ordinances. Both Town and County zoning and rules should be complementary and consistent to allow for planned growth of the island, while taking advantage of "lessons learned" in the town to avoid undesirable trends in as yet undeveloped county areas.

- C. Underground Utilities
Cameron County should utilize all legal powers and best efforts to prevent further expansion of overhead utility lines on South Padre Island.
- D. Park Road 100 Relocation
Park Road 100, commencing in Andy Bowie Park and extending approximately seven (7) miles to its present northern terminus, should be moved in whole or in parts to a more western location. Storm vulnerability and maintenance costs for sand removal would be greatly reduced, while creating new, valuable beachfront lands.

IX. SOUTH PADRE ISLAND DUNE PROTECTION & BEACH ACCESS PLAN

The Cameron County Commissioners Court has delegated the City of South Padre Island the authority to establish and implement a dune protection, beach access and flood protection plan within its corporate municipal limits. The City recognizes the importance of SB 1053 in furthering the preservation and protection of sand dunes, and the protection and enhancement of the public's rights of access to and use of the public beaches.

X. DEFINITIONS

Affect - as used in this subchapter regarding dunes, dune vegetation, and the public beach, "affect" means to produce an effect upon dunes, dune vegetation, or public beach use and access.

Amenities - any non-habitable major structures including swimming pools, bathhouses, detached garages, cabanas, pipelines, piers, canals, lakes, ditches, artificial runoff channels and other water retention structures, roads, streets, highways, parking areas and other paved areas (exceeding 144 square feet in area), underground storage tanks, and similar structures.

Back dunes - the dunes located landward of the fore dune ridge which are usually well vegetated but may also be unvegetated and migratory. These dunes supply sediment to the beach after the fore dunes and the foredune ridge have been destroyed by natural or human activities.

Beach access - the right to use and enjoy the public beach, including the rights of free and unrestricted ingress and egress to and from the public beach.

Beach/dune system - the land from the line of mean low tide to the landward limit of dune formation

Beachfront construction certificate or certificates – the document issued by a local government that certifies that the proposed construction either is consistent with the local government's dune protection and beach access plan or is inconsistent with the local government's dune protection

and beach access plan. In the latter case, the local government must specify how the construction is inconsistent with the plan, as required by the Open Beaches Act, §61.015.

Beach profile - the shape and elevation of the beach as determined by surveying a cross section of the beach.

Beach-related services - reasonable and necessary services and facilities directly related to the public beach which are provided to the public to ensure safe use of and access to and from the public beach, such as vehicular controls, management, and parking (including acquisition and maintenance of off-beach parking and access ways); sanitation and litter control; the cleaning or removal of debris from the beach by handpicking, raking, or mechanical means; law enforcement; beach nourishment projects; beach/dune system education; beach/dune protection and restoration projects; providing public facilities such as restrooms, showers, lockers, equipment rentals, and picnic areas; recreational and refreshment facilities; liability insurance; and staff and personnel necessary to provide beach-related services. Beach-related services and facilities shall serve only those areas on or immediately adjacent to the public beach.

Beach User Fee - any fee collected by Cameron County as defined in §61.001 of the Natural Resources Code, to establish and maintain beach-related services and facilities for the preservation and enhancement of access to and from and safe and healthy use of public beaches by the public.

Beach raking - mechanically drawn raking or sand sifting devices designed to remove debris, generally not wider than 16 feet, and that generally does not remove sand material.

Blowout - a breach in the dunes caused by wind erosion.

Breach - a break or gap in the continuity of a dune caused by wind or water.

Bulkhead - a structure or partition built to retain or prevent the sliding of land. A secondary purpose is to protect the upland against damage from wave action.

Coastal and shore protection project - a project designed to slow shoreline erosion or enhance shoreline stabilization, including, but not limited to, erosion response structures, beach nourishment, sediment, bypassing, construction of man-made vegetated mounds, and dune revegetation.

Commercial facility - any structure used for providing, distributing, or selling goods or services in commerce including, but not limited to, hotels, restaurants, bars, rental operations, and rental properties.

Construction - Causing or carrying out any building, bulkheading, filling, clearing, excavation, or substantial improvement to land or the size of any structure. "Building" includes, but is not limited to, all related site work and placement of construction materials on the site. "Filling" includes, but is not limited to, disposal of dredged materials. "Excavation" includes, but is not limited to, removal or alteration of dunes and dune vegetation and scraping, grading, or dredging a site. "Substantial improvements to land or the size of any structure" include, but are not limited to,

creation of vehicular or pedestrian trails, landscape work (that adversely affects dunes or dune vegetation), and increasing the size of any structure.

Coppice mounds - the initial stages of dune growth formed as sand accumulates on the downwind side of plants and other obstructions on or immediately adjacent to the beach seaward of the fore dunes. Coppice mounds may be unvegetated.

Critical dune area - those portions of the beach/dune system as designated by the General Land Office that are located within 1,000 feet of mean high tide of the Gulf of Mexico that contain dunes and dune complexes that are essential to the protection of public beaches, submerged land, and state-owned land, such as public roads and coastal public lands, from nuisance, erosion, storm surge, and high wind and waves. Critical dune areas include, but are not limited to, the dunes that store sand in the beach/dune system to replenish eroding public beaches.

Cumulative impact - the effect on beach use and access, on a critical dune area, or an area seaward of the dune protection line which results from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Dune - an emergent mound, hill, or ridge of sand, either bare or vegetated, located on land bordering the waters of the Gulf of Mexico. Dunes are naturally formed by the windward transport of sediment, but can also be created via man-made vegetated mounds. Natural dunes are usually found adjacent to the uppermost limit of wave action and are usually marked by an abrupt change in slope landward of the dry beach. The term includes coppice mounds, foredunes, dunes comprising the foredune ridge, backdunes, and man-made vegetated mounds.

Dune complex - any emergent area adjacent to the waters of the Gulf of Mexico in which several types of dunes are found or in which dunes have been established by proper management of the area. In some portions of the Texas coast, dune complexes contain depressions known as swales.

Dune protection permit or permit - the document issued by a local governments to authorize construction or other regulated activities in a specified location seaward of a dune protection line or within the critical dune area as required by §63.051 of the Texas Natural Resources Code.

Dune vegetation - flora indigenous to natural dune complexes on the Texas coast and can include coastal grasses and herbaceous and woody plants.

Effect or effects - "effects" include: direct effects – those impacts on public beach use and access, on critical dune areas, or on dunes and dune vegetation seaward of a dune protection line which are caused by the action and occur at the same time and place; and indirect effects - those impacts on beach use and access, on critical dune areas, or on dunes and dune vegetation seaward of a dune protection line which are caused by an action and are later in time or farther removed in distance than a direct effect, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including

ecosystems. "Effects" and "impacts" as used in this ordinance are synonymous. "Effects" "may be ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative.

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Eroding area - a portion of the shoreline, which is experiencing a historical erosion rate of greater than two feet per year based on published data of the University of Texas at Austin, Bureau of Economic Geology.

Erosion - natural processes and human activities affecting barrier island vegetation and dunes, usually caused by wind or water motion over or around barrier islands, which may displace, damage, or otherwise completely remove natural or artificially constructed structures on barrier islands. The wearing away of land or the removal of beach and/or dune material by wave action, tidal currents, littoral currents or deflation. Erosion includes but is not limited to horizontal recession and scour.

Erosion response structure - a hard or rigid structure built for shoreline stabilization which includes, but is not limited to, a jetty, retaining wall, groin, breakwater, bulkhead, seawall, riprap, rubble mound, revetment, or the foundation of a structure which is the functional equivalent of these specified structures.

Extraordinary emergency - emergencies judged by the chief park ranger of the Cameron County park system, or his designee, to constitute a substantial threat to public health or safety, or that present a hazard to natural resources, including but not limited to, civil disturbance, recurrent life threatening criminal activity, hurricanes, oil spills, fish kills, or extreme beach overcrowding.

FEMA - the Federal Emergency Management Agency of the United States government. This agency administers the National Flood Insurance Program and produces the Flood Insurance Rate Maps.

Fore dunes - those dunes which offer the first significant means of dissipation storm-generated wave and current energy issuing from the open Gulf of Mexico. Because various heights and configurations of dunes may perform this function, no standardized physical description can be offered. However, where they occur, fore dunes are distinguishable from surrounding dune types by their relative location and physical appearance. Fore dunes are the first clearly distinguishable, usually grass-covered, stabilized large dunes encountered landward of the open Gulf of Mexico. Although they may be large and continuous, fore dunes are typically hummocky and discontinuous and are often interrupted by breaks and wash over channels.

Fore dune ridge - the high continuous line of dunes which are usually well vegetated and rise sharply landward of the fore dune area but may rise directly from a flat, wave-cut beach immediately after a storm.

Habitable structure perimeter or footprint--The area of a lot covered by a structure used or usable for habitation. The habitable structure perimeter or footprint does not include incidental projecting

eaves, balconies, ground-level paving, landscaping, open recreational facilities (for example, pools and tennis courts), or other similar features.

Habitable structures - structures suitable for human habitation including, but not limited to, single or multi-family residences, hotels, condominium buildings, and buildings for commercial purposes. Each building of a condominium regime is considered a separate habitable structure, but if a building is divided into apartments, then the entire building, not the individual apartments are considered a single habitable structure. Additionally, a habitable structure includes porches, gazebos, and other attached improvements.

Industrial facilities - include, but are not limited to, those establishments listed in Part 1, Division D, Major Groups 20-39 and Part 1, Division E, Major Group 49 of the Standard Industrial Classification Manual as adopted by the Executive Office of the President, Office of Management and Budget (1987 ed.). However, for the purposes of this order, the establishments listed in Part 1, Division D, Major Group 20, Industry Group number 209, Industry numbers 2091 and 2092 are not considered "industrial facilities."

Large-scale construction - construction activity greater than 5,000 square feet area and habitable structures greater than two stories in height. Multiple-family habitable structures are typical of this type of construction.

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.

Material changes-- changes in project design, construction materials, or construction methods or in the condition of the construction site which occur after an application is submitted to a local government or after the local government issues a permit or certificate. Material changes are those additional or unanticipated changes which have caused or will cause adverse effects on dunes, dune vegetation, or beach access and use, or exacerbation of erosion on or adjacent to the construction site.

Mitigation sequence - the series of steps which must be taken if dunes and dune vegetation will be adversely affected. First, such adverse effects shall be avoided. Second, adverse effects shall be minimized. Third, the dunes and dune vegetation adversely affected shall be repaired, restored, or replaced. Fourth, the dunes and dune vegetation adversely affected shall be replaced or substituted to compensate for the adverse effects.

National Flood Insurance Act - 42 United States Code §§4001, et seq.

Natural resources - land, fish, wildlife, insects, biota, air, surface water, groundwater, plants, trees, habitat of flora and fauna, and other such resources.

Non-exempt pipeline - any pipeline other than those identified in the General Land Office rules for management of the beach/dune system, §15.3(s)(2)(a).

Permit condition or certificate condition - a requirement or restriction in a permit or certificate necessary to assure protection of life, natural resources, property, and adequate beach use and access rights (consistent with the Dune Protection Act) which a permittee must satisfy in order to be in compliance with the permit or certificate.

Person - an individual, firm, corporation, association, partnership, consortium, joint venture, commercial entity, the United States government, a state, a municipality, commission, political subdivision, or any international or interstate body or any other governmental entity.

Pipeline – a tube or system of tubes used for the transportation of oil, gas, chemicals, fuels, water, sewage, or other liquid, semi-liquid, or gaseous substances.

Practicable – in determining what is practicable, the Commissioners Court shall consider the effectiveness, scientific feasibility, and commercial availability of the technology or technique. The court shall also consider the cost of the technology or technique.

Production and Gathering Facilities – the equipment used to recover and move oil or gas from a well to a main pipeline, or other point of delivery such as a tank battery, and to place such oil or gas into marketable condition. Included are pipelines used as gathering lines, pumps, tanks, separators, compressors, and associated equipment and roads.

Public Beach – any beach that extends inland from the line of mean low tide to the natural line of vegetation bordering on the seaward shore of the Gulf of Mexico, or such larger contiguous area, to which the public has acquired a right of use or easement to or over by prescription, dedication, or estoppels, or has retained a right by virtue of continuous right in the public since time immemorial as recognized by law or custom. This definition does not include a beach that is not accessible by a public road or ferry as provided in § 61.021 of the Natural Resources Code.

Recreational Activity – includes, but is not limited to, hiking, sunbathing, and camping for less than 14 days. Operation of recreational vehicles is not considered a recreational activity, whether private or public.

Recreational Vehicles - means a dune buggy, marsh buggy, minibike, trail bike, jeep, all terrain vehicle, recreational off-highway vehicle, or any other mechanized vehicle that is being used for recreational purposes, but does not include any vehicle not being used for recreational purposes.

Recreational off-highway vehicle--has the same meaning assigned by §502.001, Transportation Code.

Restoration – Repair or replacement of dunes or dune vegetation.

Retaining Wall – a structure designed to contain or which primarily contains material or prevents the sliding of land. Retaining walls may collapse under the forces of normal wave activity.

Sand Budget – the amount of all sources of sediment, sediment traps, and transport of sediment within a defined area. From the sand budget, it is possible to determine whether sediment gains

and losses are in balance.

Seawall – an erosion response structure that is specifically designed to withstand wave forces.

Small Scale Construction – construction activity less than or equal to 5,000 square feet and habitable structures less than or equal to two stories in height. Single-family habitable structures are typical of this type of construction.

Structure – includes, without limitation, any building or combination of related components constructed in an ordered scheme that constitutes a work or improvement constructed on or affixed to land.

Wash Over Areas – low areas that channel hurricane flood tides across barrier islands and peninsulas into bay areas. Many washovers occupy sites of abandoned tidal channels; others are caused by storm tides where fore dunes are poorly developed or weakened by blowouts. During major storms these are areas of intense current activity where large volumes of sand are displaced from the seaward side of the island and deposited in the channels and/or on the back side of the island.

Appendix A – Cameron County Erosion Response Plan



Cameron County Erosion Response Plan

FINAL DRAFT

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October 16, 2018

Cameron County Erosion Response Plan

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Cameron County Erosion Response Plan

1.0 INTRODUCTION

To further the long-term benefits of effective shoreline management for the environment, the beach-going public, upland property owners, the economy, and the general safety and welfare of the public, Cameron County developed the following Erosion Response Plan (ERP). The County intends to implement plan recommendations once approved by the Texas General Land Office.

1.1 Purpose

In accordance with Texas law, Cameron County has elected to prepare this Erosion Response Plan. The general purpose of this plan is to explore means and methods to improve the safety and welfare of the public and to reduce costs to the people of Cameron County resulting from damage to private property and public infrastructure due to chronic beach erosion and Gulf storms.

In 2007, the Texas Legislature passed House Bill 2819, which as subsequently amended, mandated that each coastal community develop an Erosion Response Plan. Counties and cities that choose not to prepare an Erosion Response Plan are ineligible for State assistance under certain grant programs such as the Coastal Erosion Planning and Response Act. It is in the best interest of Cameron County to develop an Erosion Response Plan in accordance with the statutory and regulatory requirements of Texas Natural Resources Code §33.607 and the Texas Administrative Code, Title 31, §15.17.

In this ERP, the County seeks to promote the following four priorities:

1. Establish a 200-foot building setback line (measured landward from the line of vegetation (LOV) plus an additional 30-foot wide backside buffer area;
2. Preserve, expand, and enhance the protective dune system seaward of the building setback line to provide protection to future development from a 100-year storm;
3. Facilitate more appropriate and more landward development by assessing the relocation of Park Road 100 currently vulnerable to shoreline retreat;
4. Extend the pedestrian-only traffic beach on Zone 2 in accordance with the Open Beaches Act.

1.2 Scope of the Plan

In this plan, Cameron County has addressed erosion and storm risks along its Gulf-facing beaches. This plan does not cover the area within the City of South Padre Island, which adopted its own

plan. For the purposes of this plan, the County's Gulf beaches and dunes are divided into the following shoreline reaches:

- Zone 1 – Boca Chica Beach and Isla Blanca Park. The beach and dune area of Isla Blanca Park, adjacent to Brazos Santiago Pass, to the Rio Grande. There is limited pressure for development in this area. This zone has an average erosion rate of approximately six feet per year. It is also the site of the Space X launch facility.
- Zone 2 – Park Road 100. The beach and dune area north of the City of South Padre Island to the current end of Park Road 100, a distance of some 6.35 miles. This area has an average erosion rate of approximately ten feet per year. It also has existing road and utilities, and it is the area most likely to see development during the time period covered by this ERP.
- Zone 3 – North Beaches. The beach and dune area north of the current end of Park Road 100. This area experiences average erosion rates of approximately twelve feet per year and has no utilities or road access, other than along the beach. It is unlikely that development will occur in this area during the time period of this ERP.



Photo 1: Example of eroding dune scarp in Zone 3. By Peter Ravella, March 2016

In addition to the public beaches in Zones 1-3, the County has three parks with public beaches: Andy Bowie, E.K. Atwood and Isla Blanca. The County directly manages these parks. The County parks are discussed in more detail in Section 6.

In 1994, Cameron County adopted a Dune Protection and Beach Access Plan, (County Dune Plan) which was subsequently amended in 2006, 2010, and 2013¹ and approved by the GLO (31 TAC §15.32). Among other things, the County Dune Plan provides for the use of beach user fee revenues, procedures for establishing pedestrian beaches, permitting, and dune protection. The County has adopted a Dune Protection Line in accordance with the Dune Protection Act, Texas Natural Resources Code §63.012, of 1,000 feet west of the mean high tide line, generally running in a north-south direction. The County's Dune Protection Line is a moving line that follows the change of mean high tide along the shoreline. The Gulf shorelines in the County are generally eroding (See Appendix A), except for sections of Boca Chica Beach. The County Commissioners Court shall review the location of the Dune Protection Line at least once every five years to determine whether the line is adequately located to achieve its stated purpose. In addition, the Commissioners Court shall review the adequacy of the location of the Dune Protection Line within 90 days after a tropical storm or hurricane affects the County's Gulf shoreline as indicated in the County's Dune Protection and Beach Access Plan.

1.3 ERP Requirements

The Texas General Land Office (GLO) has adopted rules that set forth requirements for an Erosion Response Plan (31 TAC §15.17). In general, the rules provide that an ERP may include the following elements:

- Construction setback limits
- Prohibitions on construction seaward of the setback line
- Any exemptions from the setback line
- Requirements for any exempt construction
- Procedures to preserve and enhance public access
- Procedures for protection and enhancement of dunes
- Criteria for voluntary acquisition or buyout
- Post-storm recovery plans

1.4 Process for Development, Adoption, and Certification

The GLO has adopted rules describing the process for development, adoption, and certification of an ERP (31 TAC §15.17(b)-(d)). In preparing this ERP, the County was required to use historical erosion data and other relevant data from the State Coastal Erosion Response Plan and hold at least one public educational meeting on the ERP before implementation. The County must formally adopt the ERP and submit to the GLO for approval as provided by 31 TAC §15.3(o).

¹ Available at www.co.cameron.tx.us/parks/docs/BeachAccessDunePlan.pdf

The County held three public workshops as part of the development of the ERP on October 28 and December 15, 2015, and on February 22, 2016. The County's project team also met with beachfront landowners on January 22 and February 19, 2016, with the South Padre Island Board of Realtors on December 10, 2015, and with the local chapter of the American Shore & Beach Preservation Association on December 11, 2015. In addition, during the development of this ERP, a project website was available at www.cameroncountyperp.com where the public was able to find information and post questions about the development of the ERP.

On April 11, 2016, a draft of this ERP was made available for public review and comment. On August 24th, 2016, the County organized a meeting in Austin of the local legislative delegation and representatives from the Land Office and the Federal Emergency Management Agency to discuss the ERP.

After revising this ERP in response to public and Land Office comment in December 2016, the revised draft of the ERP was approved by the Commissioner's Court on January 26, 2017, for informal review by the Land Office. The informal review draft was also posted on the ERP Project website and made available for further public comment.

A final draft of the ERP was then prepared in **October 16 of 2018**, incorporating comments from the Land Office and the public. This final draft was posted on the County project website on October 16, 2018 and made available to the public prior to presenting the ERP to the Commissioner's Court. On **December 11, 2018**, a public educational meeting and hearing was held during the regular meeting of the Cameron County Commissioners Court before they approved this ERP and authorized its submittal to the Land Office.

1.5 Potential Future Land Uses

There are three issues with the potential impact to development and land use in the area of Zone 2 along Park Road 100: the existence of platted parcels, the proposed new causeway to the mainland, and the proposed relocation of Park Road 100. At this time, future development of the North Beaches in Zone 3 is unlikely due to the amount of land available in Zone 2, the lack of road, power, water/sewer, and other utilities north of Park Road 100, and restrictions on extending public infrastructure to undeveloped areas under the federal Coastal Barrier Resources Act (COBRA). Future development also is unlikely in the area of Boca Chica Beach (Zone 1) due to the remoteness of the area, the lands conserved in Brazos Island State Park, and the presence of the Space X launch facility.

1.5.1 Platted Parcels

In Zone 2, seaward of Park Road 100, there is a diverse range of property ownership. Between the northern limits of the City of South Padre Island to Beach Access #6, a distance of some 3.5 miles, there are only a few owners of large tracts that run from the beach to the Laguna Madre. North of Beach Access #6 to the end of Park Road 100, there is a wider range of ownership. Many of the large tracts running across the island from the beach to the Laguna are under single ownership. Some of the tracts, however, have been subdivided with the lots divided among multiple owners. (See Appendix C, Properties Impacted by building setback line).

Where the tracts have been subdivided, some individual lots lie entirely within the public beach. Other lots now appear to be in the Gulf of Mexico and now subsumed into the state-owned submerged lands (Figure 1). Our understanding is that these individual lots were all above high tide when they were subdivided and platted in the 60's. That so many of these lots are now on the public beach or below the line of mean high tide is evidence of the long-term erosion along these Gulf beaches.

The subdivided tracts included platted streets that run from Park Road 100 to the beach. These streets could be used to provide new, improved beach access points.

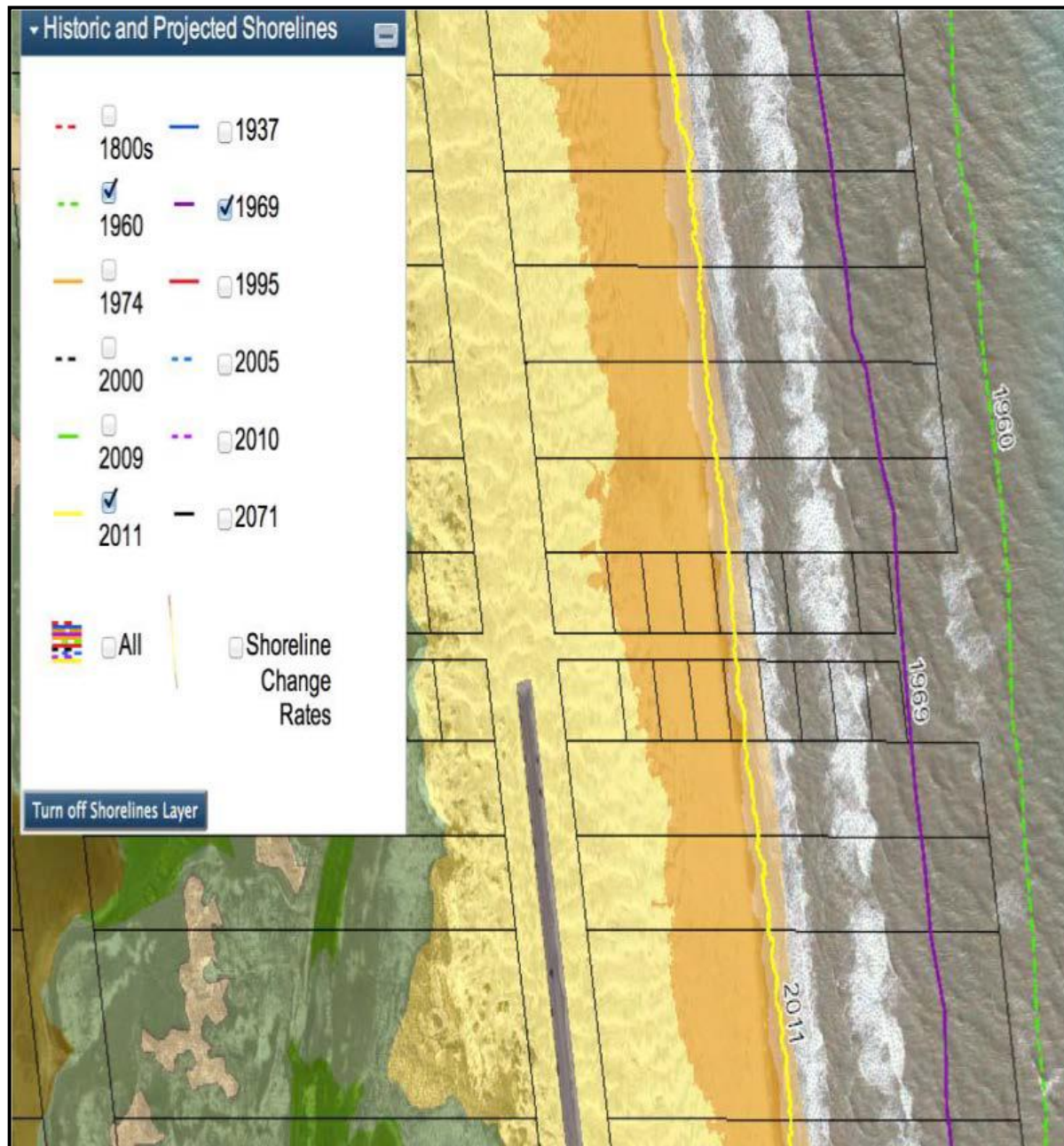


Figure 1 Platted Parcels north end of Park Road 100 (Zone 2 and 3).

1.5.2 Proposed New Causeway

The 2nd Access Project by the Cameron County Regional Mobility Authority would create a new accessway to Padre Island composed of three major components: the mainland roadway, the

crossing of the Laguna Madre, and the roadway on Padre Island.² Only the third of those components, the island roadway, is relevant to this ERP.

The 2nd Access Project is currently under development and, once funding is acquired, it is anticipated that it would take three years to complete construction of the new causeway. The preferred alternative for the 2nd Access Project, Alternative 6, is projected to impact 28.31 acres of dunes. The 2nd Access Project is projected to induce an additional 51.6 acres of residential development and 16.2 acres of commercial development by 2030, under the assumptions when the draft environmental impact statement was prepared as adjusted to discount the assumption that the new causeway would be open by 2015. This development would likely occur in the area of Park Road 100 addressed in this ERP. Construction of the new causeway would also improve access to the public beaches in the areas of Park Road 100 (Zone 2) and North Beaches (Zone 3), likely increasing use of those beaches. The landing where the new causeway intersects Park Road 100 would also need to be protected from shoreline change. To date, the project is still under development and construction has not begun.

1.5.3 Possible Relocation of Park Road 100

Currently, Park Road 100 in Zone 2 lies within close proximity to the beach, ranging from 300 to 500 feet landward of the MHHW line. Wind-blown sand regularly encroaches on the road and, in some cases, can create dune ridges which extend into or across the road, disrupting traffic. In its current location, Park Road 100 is vulnerable to shoreline retreat, is costly to clear and maintain, and limits the land area seaward of the road right of way. As shoreline retreat continues, the location of Park Road 100 will significantly impair the protection offered by the dune system, and constrain future development opportunities.

Park Road 100 in its current alignment is vulnerable to flooding during storms, even storms that do not make landfall in South Texas. During recent events, the road flooded during Hurricanes Katrina, Rita, and Ike even though those storms landed on the Upper Texas Coast or in Louisiana. There are seven historical washover areas along Park Road 100 that have consistently flooded during storms.

² Project information is available at http://ccrma.org/wp-content/uploads/2018/08/CCRMA-Project-Status-Report-2017_Final.pdf

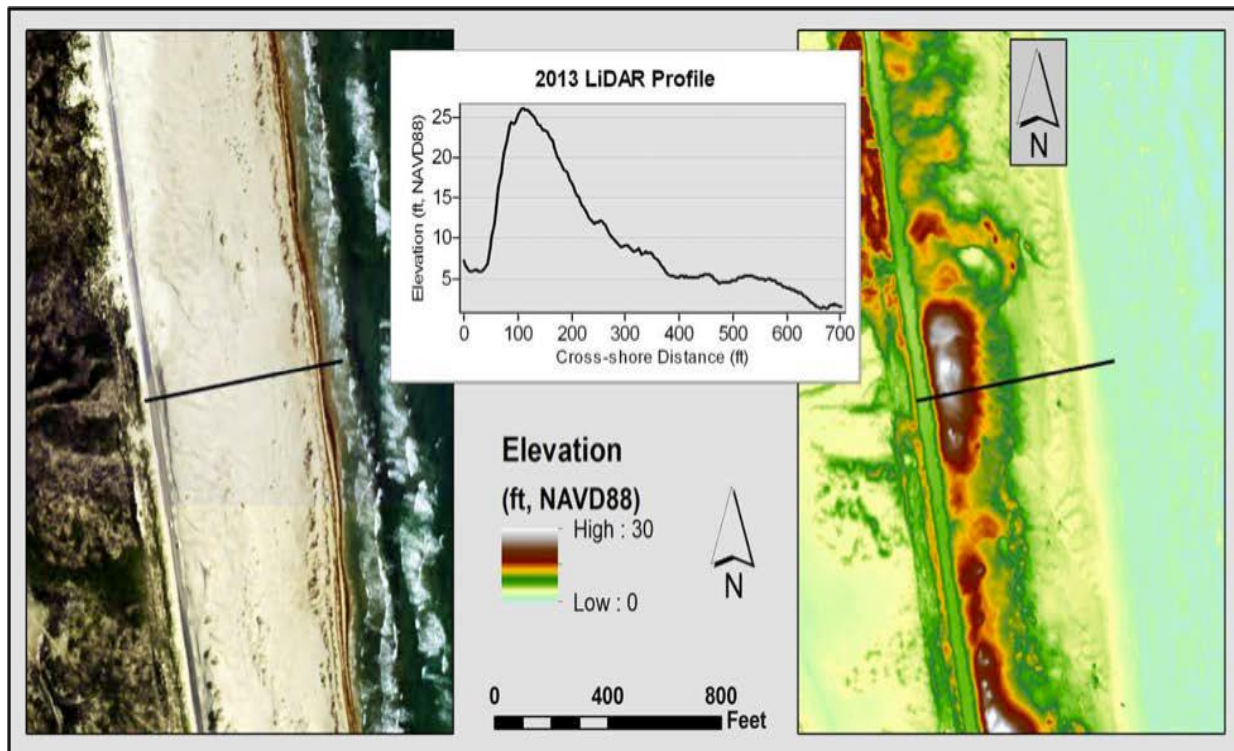


Figure 2 Unvegetated natural dune cross-section seaward of the northern end of Park Road 100 in Cameron County.

Park Road 100 also is subject to blowing and drifting sand. Currently, there are four areas where the road is exposed to the beach and Gulf with no dunes for protection. These areas allow windblown and drifting sand to blow into and across the road, creating obstructions to travel and allowing the sand to move out of the beach dune system and into the back side of the island. Windblown sand on the road also requires ongoing removal, a cost borne by the Texas Department of Transportation.

The cross-section in Figure 2 illustrates a well-developed dune resting on a +5-ft NAVD88 berm migrating landward toward the road. This dune could be relocated seaward of its present position and vegetated to trap wind-blown sand closer to the beach, providing protection for inland habitats and reducing maintenance of Park Road 100.



Photo 2: Park Road 100. Note sand adjacent to the road. By Jeb Boyt

Alternatively, the current County Dune Plan recommends that Park Road 100 be relocated to a more westerly alignment from the landing of the second causeway to its present northern terminus and (Figure 3). For most of Zone 2, there is already an existing right-of-way between Park Road 100's current alignment and the Laguna (Figure 3). Some of the large landowners immediately north of the city limits, where there is no existing right-of-way, have expressed support for the relocation of Park Road 100. Relocating the road will allow space for both dune restoration and economically beneficial upland development while reducing the vulnerability of development and public infrastructure to storms and reducing the ongoing cost for removing sand from the road.



Figure 3. Example of potential westerly relocation of Park Road 100 into existing platted

2.0 COUNTY FINDINGS & CONCLUSIONS

2.1. Gulf Beach Shoreline Conditions

1. The Zone 1 and Zone 2 Gulf beaches in Cameron County are in a persistent erosive condition, with an annual shoreline retreat rate (1950 to 2012) ranging from over 20 feet per year (in the southern end of Zone 1) to more than 14 feet per year (in the northern end of Zone 2), and a retreat rate of between 6 and 17 feet per year in Zone 3. The Zone 1 annual erosion rate is more than 20 feet per year near the mouth of the Rio Grande, but near the Brazos-Santiago Pass accretion is taking place at up to 4.9 feet per year (UTBEG **Change Rate 1950s - 2012**).
2. The erosion rates in all zones are expected to continue unless a shoreline stabilization program, such as periodic beach nourishment, is developed, permitted, funded and implemented.
3. According to the Harte Research Institute, Texas A&M Corpus Christi, the shoreline position in Zone 2 will erode back to a position landward of Park Road 100 by 2071. (See <http://geohazards.tamucc.edu/southpadre/SPIgeohaz.html>)
4. Shoreline retreat is not always a continuous and steady process with the beach eroding at a steady rate each year. Tropical storms and hurricanes along the lower Texas coast can move the shoreline more than 100 feet landward in a day. There is often dramatic recovery for months and years following a storm, but it is often incomplete in an area undergoing long-term retreat, and the shoreline may remain significantly landward of its pre-storm position.
5. Cameron County has lost 474 acres of beachfront land from 1937 to 1995 in the area from the Brazos Santiago Pass to the end of Park Road 100, a distance of approximately 12 miles of Gulf beach shoreline. (See James C. Gibeaut and Thomas A. Tremblay, Final Report: Coastal Hazards Atlas of Texas: A Tool for Hurricane Preparedness and Coastal Management – Volume 3, The South Coast (August 2003), page 12).
6. Cameron County can expect to lose an additional 511 acres of beachfront land in the area from the Brazos Santiago Pass to the end of Park Road 100. (See Coastal Hazards Atlas, Volume 3, page 12).
7. Cameron County lies in a semi-arid climatic zone with relatively low precipitation and is an area subjected to regular and persistent winds which exceed 10 mph 75% of the time. These conditions result in irregular and sparse dune vegetation, increase the

- difficulty of dune restoration, and contribute to significant rates of Aeolian or wind-driven sand transport out of the nearshore dune system.
8. As recognized by the Texas Legislature, Land Office, and Cameron County, the coastal dune system is critical to the protection of upland property and is the first line of defense against shoreline storm damage.
 9. Vehicles driving on the beach adversely impact beach health and dune stability.
 10. Vehicular driving on the beach should, where possible, be eliminated over time while preserving and enhancing public beach access in a manner consistent with the Texas Open Beaches Act and the County Beach Access and Dune Protection Plan.

2.2 Upland Risks

1. Based on shoreline erosion rates and the irregular condition of the dune system, construction of habitable structures seaward of the building setback line poses a substantial risk to public health, safety and welfare and should be discouraged.
2. The County finds that the area seaward of the building setback line is a FEMA designated coastal high hazard area for flooding during tropical storms and that any structures built seaward of the building setback line would be at risk of flooding and potential damage from storm surge and storm waves.
3. FEMA has determined that in coastal high hazard areas, including the area seaward of the building setback line, there is a 26% chance that structures built in this area will be damaged by a 100-year storm over the typical 30-year life of a home mortgage.
4. Substantial land losses in Zones 2 and 3 are expected to continue; moderate land losses are expected in portions of the eroding areas of Zone 1.
5. In Zone 2, Park Road 100, a state roadway, is vulnerable to drifting sand, tropical storms, and long-term shoreline retreat.

2.3 . Principle Objectives of the ERP

1. Establish a building setback line – Based on the projected shoreline position in 30 years, the County is proposing that a building setback line (BSL) be established to conserve a protected dune line and to limit construction in this high hazard area. The building setback line begins from the existing line of vegetation (LOV) as defined in the Texas Natural Resources Code §61.016-61.017, and extends 200 feet landward. An additional 30-foot dune buffer area is then included to avoid and minimize impacts to the dunes and to allow for natural dune migration, hydrology, and other processes. Therefore, based on the historical erosion rates obtained from the University of Texas Bureau of Economic Geology over 30 years and the desire to conserve a protected dune line, a total building setback line is proposed for the shoreline area extending 230 feet landward from the LOV.
2. Protective dune system enhancement– Preserve, expand, and enhance the protective dune system seaward of the building setback line to provide protection to future development from a 100-year storm.
3. Possible Relocation of Park Road 100 – Park Road 100, a state roadway, encroaches into the dune system, is vulnerable to long-term shoreline retreat, and constrains future development. The County will continue to encourage relocation to a more landward alignment in cooperation with the local landowners and the Texas Department of Transportation.
4. Extension of the Zone 2 Pedestrian Beach – Based on the vulnerability of the shoreline and the adverse impacts of vehicle driving to the beach and dune system, the County will work cooperatively with the General Land Office, affected landowners and stakeholders to extend and expand the pedestrian beach in Zone 2, consistent with the Open Beaches Act.

3.0 RISK REDUCTION STRATEGY

3.1 Building Setback Line

Cameron County seeks to establish a building setback line (BSL), where the area seaward of this line will include a storm protection dune system north of the City of South Padre Island in Zone 2. Dune conservation and management are critical components of the Cameron County ERP because sand exchange between the beach-dune system impacts long-term shoreline response, storm damages, and land use practices. Unvegetated dunes and low-lying washover terraces are common, and wind-blown sand transport is substantial. Soft structure dune design helps maintain the natural appearance of the coastline and preserve natural shoreline dynamics (NOAA 2010).

This allows natural erosion and accretion cycles to occur (Fenster 2005) without interrupting the natural sediment budget.

The BSL and recommended storm protection dune system to be located seaward of it is intended to protect habitat and upland infrastructure from coastal storm impacts. The recommended design of dunes to be constructed and restored seaward of the BSL was based on: 1) natural dune morphology and topography in Zone 2) FEMA guidelines for protection against a single 100-yr storm event (FEMA, 2011) (Figure 4).

The objectives of the BSL for Zone 2 are as follows:

1. Reduce public expenditures for erosion and storm damage losses to public and private property, including public beaches;
2. Provide a beach erosion risk buffer between the public beach and private development, consistent with existing natural dune systems;
3. Assure public beach access through improvements to existing access points and advanced design of future access points;
4. Promote the health and stability of existing dune systems and vegetation;
5. Promote natural recovery of dunes and beaches following storm-induced erosion, and implement dune strategies to maximize sand trapping (vegetative planting and sand fencing).

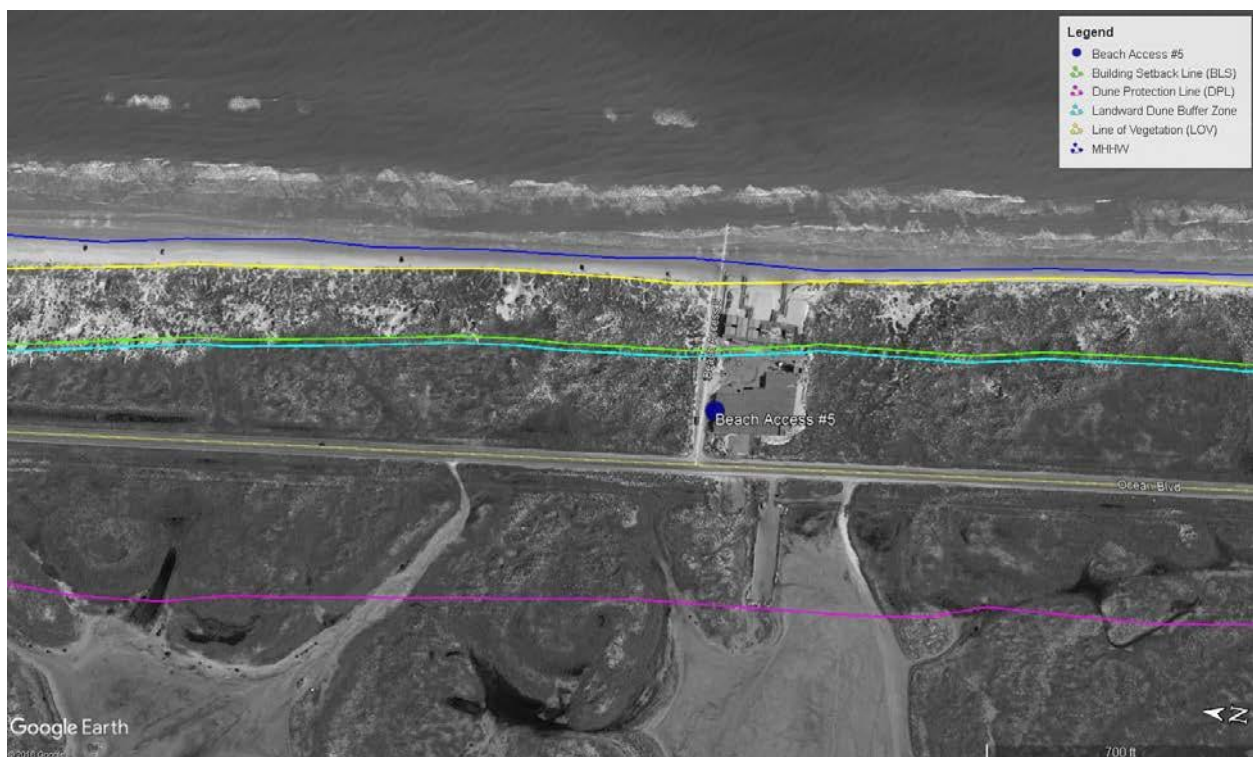


Figure 4 Location of MHHW, LOV, BSL, dune buffer zone and DPL.

3.1.1 Designing with Nature – Dune Location, Elevation, and Width

Based on natural variations in dune morphology and topography north of The Shores and along Brazos Island, with emphasis placed on vegetated dune features seaward of Park Road 100, natural dune shape was used to establish dimensions for a recommended dune seaward of the BSL (Figure 6). Considering FEMA (2011) guidelines, the proposed dune was designed to provide protection to inland habitat and infrastructure for a 100-yr storm event.

The recommended reference point used for the seaward boundary of the BSL is the line of vegetation as determined by the Texas Natural Resources Code §61.016-61.017. Final location of the BSL for management purposes will be based on a line of vegetation determination approved by the Texas General Land Office at the time construction is being proposed.

Dune morphology varies considerably along the undeveloped beaches of Cameron County; however, areas with vegetated dunes generally have elevations of between 8 and 16 ft NAVD88 or greater, and dune crest widths of about 60 ft or greater. Dune face slope has large variations as well, but an average slope of 1:5 was common.

3.1.2 Proposed Storm Protection Dune

Given natural dune dimensions in Zone 2 and FEMA storm-protection considerations, the typical storm protection dune cross-section is recommended with the seaward toe located at the line of vegetation in Zone 2. The proposed dune should have a maximum slope of 1:5, a minimum base width of 200 feet, a height of +16 feet NAVD88, and a crest width of 90 feet (Figure 6). Given these dimensions, dune volume above +11 feet NAVD88 (Base Flood Elevation [BFE]) will be approximately 575 cubic feet per foot width of dune face (Figure 6). FEMA (2011) recommends 540 cubic feet per foot width of dune above BFE to provide protection from a single 100-yr storm event. Approximate sand volume required to construct this dune feature will be 1,595 cubic feet (59 cubic yards) per foot width along the dune. Generally, dune restoration should take place in areas with a dune elevation of less than 11 feet NAVD88.

The recommended position of the storm protection dune, with the seaward toe located at the line of vegetation in Zone 2, will ensure that the dune will not encroach on the public beach easement and make the dune less vulnerable to loss. Because basic dune processes often cause transport of sediment inland of the dune crest, the creation of a buffer zone at the inland margin of the dune supports continuity of dune processes, form, and habitat as the dune naturally shifts inland (Psuty and Rohr 2000 suggest a minimum inland dune buffer of at least 30 feet). For management purposes, it is desirable to establish a dune buffer area landward of the storm protection dune to permit some inland extension for natural dune processes.

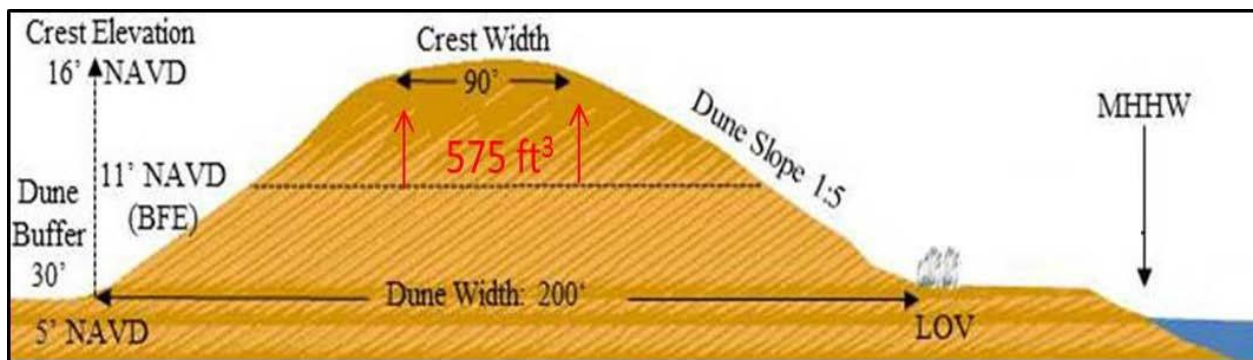


Figure 6. Example of the storm protection dune dimensions and buffer area in the area seaward of the Building setback line (not to scale).

To summarize, practical dimensions for a 230-foot wide BSL and storm protection dune should consist of the following:

- The seaward toe of the storm protection dune shall be located at the LOV.
- A 200-foot wide storm protection dune and BSL. Wider dune zones support higher dunes which provide more benefit.
- A 30-foot buffer area landward of the storm protection dune to accommodate natural dune migration.

A dune restoration project may not encroach onto the public beach.

3.2 Dune Management Considerations

Dune management is a critical component of the Cameron County ERP because sand exchange between the beach-dune system impacts long-term shoreline response and land use practices. Beach areas where storm washover is common, wind-blown sand is dominant, and dune vegetation is limited illustrate greater shoreline erosion rates than beach areas where vegetated and elevated dunes are present. Long-term evolution and maintenance of dunes depend on the positioning and morphology of the incipient dune, the sediment budget of the beach-dune system, and natural maintenance by wind transport processes.

Cameron County has relatively high shoreline recession rates, but dunes of varying height and vegetative cover exist along much of its undeveloped coast. The large volume of the sand available for transport within these areas has numerous management implications. For example, on coasts with high volumetric gains in the beach and dune sand, implementing various passive restoration strategies, such as dune fencing and vegetative planting, would hasten foredune development. Caudle et al. (2014) conducted a volumetric analysis from Lidar of the beach and dune systems on South Padre and Brazos Islands for 2000, 2010, and 2013. Their findings and their importance to the ERP for dune design, sand retention and management include:

1. Much less sand is stored in the beach and dune system on Brazos Island than on the whole of South Padre Island (Figure 7).

ERP: Brazos Island (ZONE 1) lacks overwash features for cross-shore sediment input, volume below 4m (12 ft) remains constant; potential advantages include reduced dune design requirements as compared to South Padre.

2. Reduction in sand volume by approximately half with each 1-m (3 ft) increase in threshold elevation is constant throughout the 1- to 6-m (3 to 20 ft) elevation ranges.

ERP: Provides insight for recommended minimum heights, widths, and sand volume for dune designs.

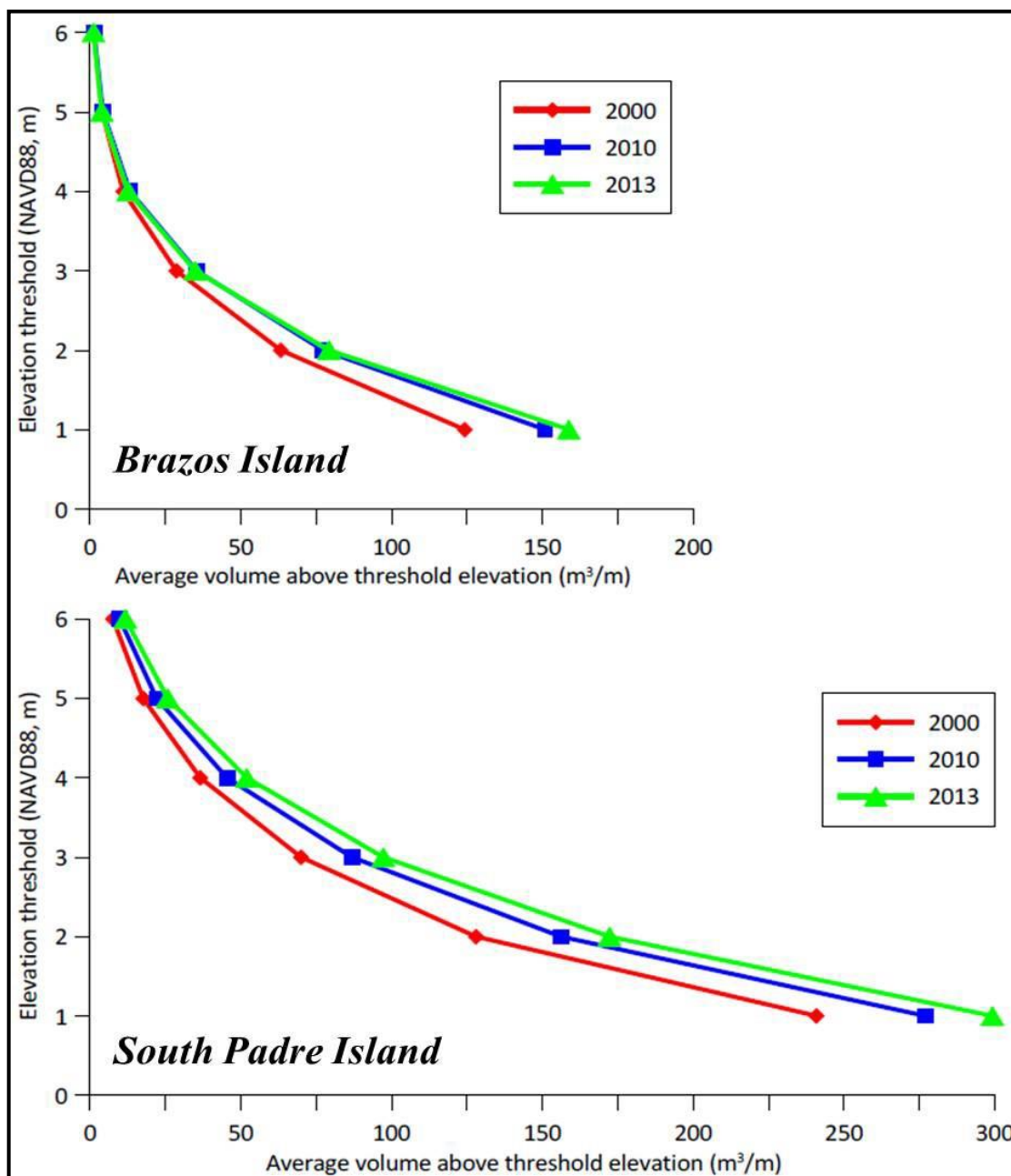


Figure 7. Average volume of sand above threshold elevations in 2000, 2010, 2013 for Brazos and South Padre Islands. Threshold volumes increase through time (Caudle et al. 2014).

- The undeveloped areas of South Padre Island have an extensive and mature foredune area (Zones 2 and 3), except in areas of washover, particularly in Zone 3. Storage capacity within these sections (with and without the road) is extremely high owing to the availability of sediment, and lack of development constraining the dune system (Figure 8).

ERP: Important for strengthening and enhancing existing dune systems, availability for using “in situ” sand for construction of storm protection dune, and further developing

extensive dune fields through vegetative planting and sand fencing. Generally, all areas seaward of the building setback line with dune elevations less than +11 ft NAVD88 will be priority areas for landowners constructing protective dunes.

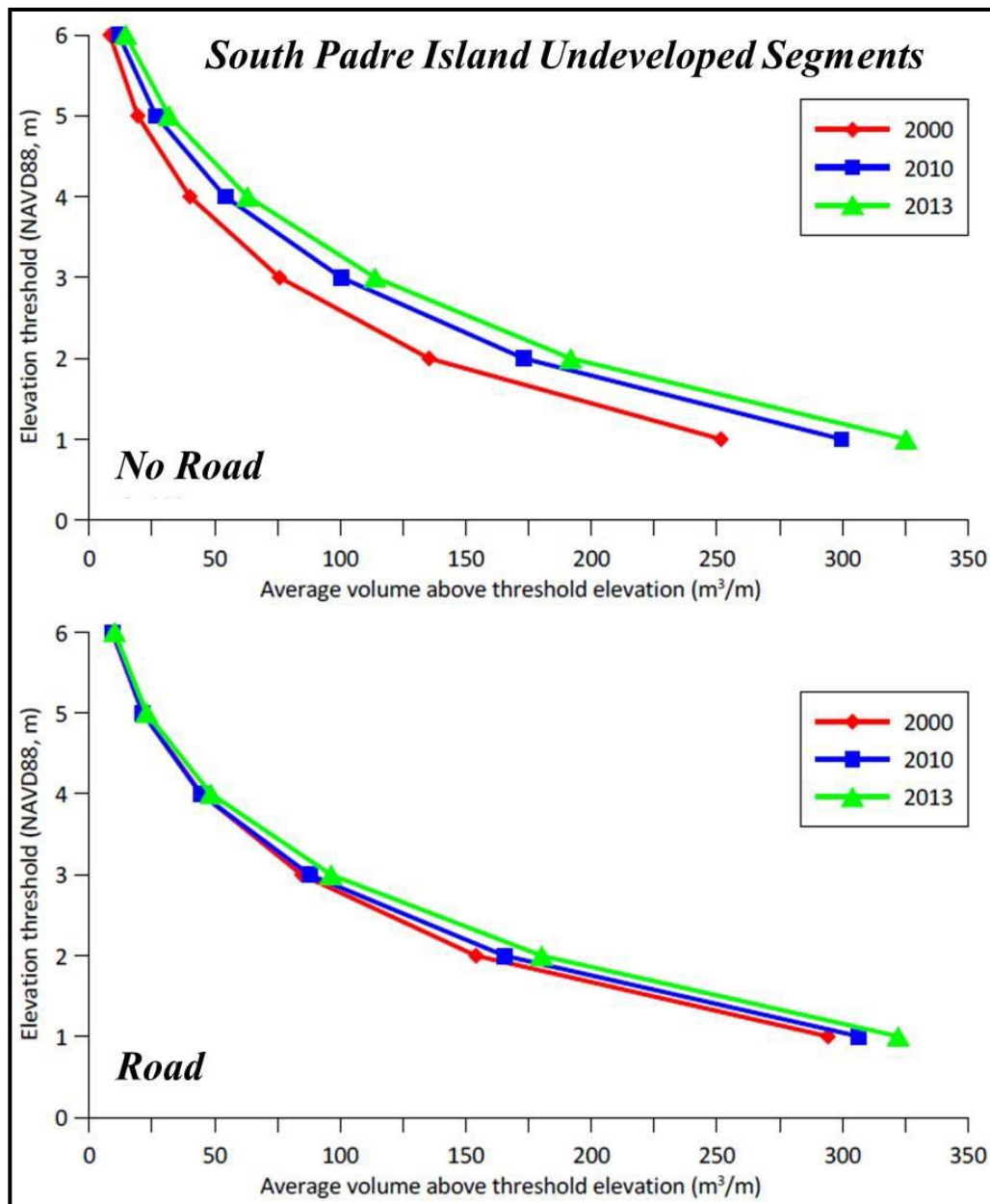


Figure 8. Sand volume comparison of undeveloped segments of Cameron County shoreline with and without Park Road 100(Caudle et al. 2014).

- The undeveloped area of South Padre Island had 2 to 4 times the volume of sand at lower threshold elevations than did the heavily developed southernmost sections.

ERP: High potential to trap and capture wind-blown sand because a high base volume of sand is available.

3.2.1 Dune Vegetation

Vegetating newly constructed or existing dunes can be economical and effective in stabilizing features and creating an additional baffle to encourage more deposition. Without vegetation, blowing sand will migrate inland out of the active beach-dune transport zone. Maintaining dense, healthy dune vegetation is one of the best means of stabilizing a dune and enhancing sand deposition.

Certain types of vegetation can tolerate the harsh conditions of heat, aridity, high salinity, and low nutrient availability along the coast. Termed “pioneer plants” they comprise the dune grasses and other plants that colonize the seaward face or crest of the foredunes (Psuty and Rhor 2000). These primary plants are the natural foundation for the creation of dunes. When airborne sand moves across their stems and leaves, wind velocity is decreases and sand is deposited around vegetation, beginning the natural cycle of dune formation. As sand accumulates around primary vegetation, roots and rhizomes spread from which new plants grow. This dense vegetation anchors the dune below the surface and stabilizes sediment on the surface providing a natural barrier to incoming waves. Without the presence of dune vegetation, dunes become extremely vulnerable to the forces that create them (Psuty and Rhor 2000).

Further, vehicles and foot traffic dislodge beach vegetation, disrupting the capacity of plants to capture sand. The primary geomorphic processes affected by vehicular (and pedestrian) traffic are wind erosion, transport, and deposition. Wind velocities decrease near the ground surface, so sand lifted into the air by vehicles and/or rutting of the surface exposes the sand grains to greater wind action. As a result, areas with vehicular traffic have much smoother, flatter, and broader backbeach areas than those without vehicular traffic (Weise and White 1980). Such grading of beaches is detrimental to embryo (coppice) dune formation, as well as to pioneering and colonizing plant species (Baccus and Horton 1982).

It is in the best interest of the landowners to adhere to the following recommendations: the ideal percentage of vegetative cover should start at 100 percent for all disturbed areas due to the severity of wind-blown erosion. Densities should vary on initial planting to provide additional stability on the windward edge to the freshly disturbed sand. These recommendations do not substitute for dune protection standards required under TAC §15.4 that require permittees to mitigate for adverse effects to dunes and dune vegetation at a 1:1 ratio for vegetative cover and dune volume.

Specific recommended guidelines for dune restoration are as follows:

1. The leading edge of the ocean-side dune system should have a row of discontinuous sand fences placed parallel to the beach approximately 20 feet seaward of the line of vegetation, contingent on the GLO determination that the sands fences will not

- encroach on the public beach easement, for wind velocity reduction, sand trapping and foot and vehicle traffic control.
2. The dune should be under constant irrigation to prevent wind erosion and to re-establish the minimal percentage of water content for vegetation.
 3. The ocean-side, 5 feet prior to the leading edge of the dune, should be planted in Sea Oats and Bitter panicum (equal mix) at a density of 1 foot on center. This plant mix and density should continue up slope for the first 1/3 of the slope.
 4. The vegetation should then change to a mix of 85% Sea Oats, 10% Bitter panicum and 5% other species planted at a density of 18" on center. This should continue until within 5 feet of the crest of the dune.
 5. From 5 feet below the crest of the ocean-side face of the dune to an area 15 feet back from the crest of the dune the plant mix should be Sea Oats and Bitter Panicum (equally) and planted on a density of 1 foot centers.
 6. The remainder of the crest of the dune should be planted in a mix of 95% Sea Oats and 5% Bitter Panicum. This should be on 18" plant spacing and continue to within 5 feet of the landward edge of the crest of the dune.
 7. The entire landward edge including the 5 feet left on top and 5 feet past the toe of the dune, should be planted in Sea Oats and Bitter Panicum (equal) on 1 foot spacing.
 8. Based on wind conditions at the time of construction and during the first 90 days after planting of vegetation, additional fencing may be required on the front and back edges of the dune crest.
 9. The plant species for the initial plantings should include native species including but not limited to:
 - Sea Oats
 - Bitter Panicum
 - Railroad Vine
 - Purslanes
 - Marshhay cordgrassSubsequent plantings should include but not be limited to:
 - Fimbristylis
 - Seacoast Bluestem
 - Bushy Bluestem
 - Texas Prickly Pear
 - Beach Evening Primrose
 - Camphor Daisy
 10. Due to the semi-arid climate conditions in Cameron County, fertilization may greatly increase the survivability of newly planted dune vegetation. Fertilization may be started at planting, with the introduction of slow release fertilizers applied in-hole with each plant.

11. No mowing may occur seaward of the building setback line or seaward of the Dune Protection Line.

3.3 Beach and Shoreline Management

The amount of sand available within the system is a critical consideration when determining the most appropriate strategy for shoreline management.

3.3.1 Goal: Reduce Sand Volume Losses

Beach sand volume losses result from waves and current processes when the threshold velocity for sand movement is exceeded and transport volumes from a beach area are greater than those entering the same beach area. Alongshore and cross-shore sand transport are most common processes impacting beach sand volume losses, but storm washover and wind-blown sand from the beach to interior portions of SPI are significant transport processes contributing to beach erosion. Washover and wind-blown sand losses from the beach can be captured with appropriate dune management practices, but littoral sand transport along rapidly receding coasts often require beach sand replenishment to mitigate erosion. To reduce beach sand losses, dune, and washover terraces, land use management practices should be implemented to enhance habitat resilience and protect public and private infrastructure.

3.3.2 Sand Volume Requirements for Beach Restoration

Shoreline changes along the undeveloped coast of Cameron County documented average beach erosion for all zones since 1939. If one were interested in restoring the undeveloped beach to the approximate time when sand began to be placed on the beach fronting the City of SPI (1997), about 6.2 million cy would be required for Zone 2 and 12.8 million cubic yards (cy) of sand volume placement would be required for Zone 3 (Table 1). This would extend the existing shoreline position seaward to the approximate location of the 1995 shoreline.

Table 1. Beach erosion estimates based on average shoreline change rates for the undeveloped coast of Cameron County (Caudle et.al., 2014)			
Period/Zone	Beach Sand Volume Associated with Shoreline Change (cy)		
	1	2	3
1939-1995	-13,100,000	-20,500,000	-44,200,000
1995-2014	-2,400,000	-6,200,000	-12,800,000
1939-2014	-15,500,000	-26,700,000	-57,000,000

3.3.3 Available Sand Resources

A variety of potential sand sources can be considered for long-term planning purposes for both dune and beach sand placement. Sediment characteristics and suitability for different size and time horizons varies among the sources. The following is a general list of possible sand sources for use on beaches in the study area. An offshore sand resource study was completed for SPI (HDR 2008); however, a more detailed sand resource evaluation will be required to identify sand necessary for any proposed beach restoration activities.

- Offshore Cameron County (State and Federal waters)
- Offshore Willacy County (State and Federal waters)
- Land Cut Private Sources
- Other Inland Private Sources

From published tidal datums for NOAA tidal station 8779750 (South Padre Island, Brazos Santiago Pass TX), MHHW equals +0.18 m (0.6 feet) NAVD88. Using 2009 Lidar data, average beach width, the distance between MHHW and a potential vegetation line (as defined by Caudle et al., 2014) for Zone 2 was determined to be 110 feet. Limited beach width can affect the development of full aeolian sediment transport. Davidson-Arnott and Law (1990) found for wind speeds of 12 mph (similar to the SPI average wind speed), a 50-ft wide beach is needed to achieve full sand transport. Therefore, average beach width of 110 ft has more than enough surface area to ensure active sand transport can continue across and along the beach.

The average beach width mentioned above will be used to assess areas where the beach has narrowed due to erosion and will assist the County in prioritizing areas where beach nourishment may be needed to widen the beach.

3.3.4 Sand Volume Requirements for the Storm Protection Dune

A volumetric analysis was completed from 2013 Lidar data of numerous washover terraces segmenting the beach and dune systems along the upper northern beach of Zone 2. This zone includes the beach and dune area north of the City of South Padre Island to the end of Park Road 100, a distance of approximately 6.4 miles. The purpose for conducting the analysis was to confirm the volume of sediment required to meet the storm protection dune volumetric requirements, and determine whether sufficient quantities of sand are available “in situ” or would other sand sources be required that were located “off-site”. Overall, enough sand exists seaward of Highway 100 for the undeveloped portion of Cameron County to construct a storm protection dune feature seaward of the BSL. This constructed dune would protect inland habitat, future public and private

construction, and potentially mitigate high shoreline erosion rates in this area by limiting storm overwash and controlling windblown sand deposition within the active beach-dune system.

4.0 PROCEDURES FOR PRESERVING, RESTORING AND ENHANCING CRITICAL SAND DUNES

The County recognizes that the public beach and the dune system is the first line of defense against storm surge. Through the ERP and administration of the Dune Protection and Beach Access Program, and the Dune Protection Permitting process, the County shall work closely with the property owners to reduce the shoreline erosion rate, maintain the public beach, promote dune restoration and enhancement, and enhance public beach access.



Photo 3- Zone 3 Dunes and Coppice Mounds, Lat. 26.4539, Long. 97.2391, Photo by P. Ravella, Feb. 2016

The County's current beachfront is eroding and future development will, whenever possible, be permitted only landward of the building setback line and buffer. The County's fundamental strategy to reduce or minimize future losses and damages due to shoreline retreat and storms is to: (1) limit development of habitable structures to more landward locations, and (2) protect and enhance the dunes seaward of the building setback line and buffer in order to provide a consistent level of protection against 100-year storm events.

Nonetheless, under limited circumstances the ERP may allow property owners to construct habitable structures seaward of the building setback line and buffer. Beachfront Construction Certificate and Dune Protection Permit must be issued by the County and an Exemption Petition is approved as described in this ERP and in the Cameron County Beach Access and Dune Protection Plan for such construction.

The County will apply for Coastal Erosion Planning and Response Act (CEPRA) funding to reduce shoreline beach erosion on the public beach. In lieu of receiving CEPRA funds, the strategy is to work with landowners and developers to achieve this ERP's intended goals.

4.1 Dune Protection and Management to Protect Public and Private Property from Severe Meteorological Events

The County shall encourage beachfront landowners to protect, manage and restore the dune system in a manner that will protect public and private property from severe meteorological events through the development of a continuous foredune ridge. For the purposes of the ERP, a "severe meteorological event" is defined as a 100-year storm event.

4.1.1 Overview and Goals

Working cooperatively with beachfront landowners, and through establishment and management of a storm protection dune, the County seeks to:

- a. Minimize and reduce future storm damage due to inappropriate nearshore construction;
- b. Increase coastal resiliency and protect public and private property from future storm and flood impacts;
- c. Protect, preserve, and enhance the critical dune system along the Gulf shoreline;
- d. Adopt and implement procedures to limit construction seaward of the building setback line and buffer; and
- e. Allow development to occur in a manner consistent with sound dune management practices while providing a buffer to accommodate future shoreline retreat.

Specifically, the County's goal is to promote, restore, enhance and maintain a continuous foredune ridge seaward of the building setback line in order to provide coastal resiliency and protect against the risk of damage from a 100-year storm, in accordance with guidance from the Federal Emergency Management Agency (FEMA).

4.1.2 Landowner Cooperation and Coordination

Under this ERP, the County shall work cooperatively and in coordination with private landowners to plan, design, permit and implement a program to protect and enhance the dune system. The County recognizes that with the exception of limited County park areas, beach accesses, and platted road rights-of-way, portions of the area seaward of the building setback line are privately owned.

The County further recognizes that it cannot independently design, permit, and undertake dune restoration activities on private land without the consent or approval of the land owner.

The County will encourage the landowners to develop and implement the dune restoration, preservation, and enhancement measures outlined in this ERP.

4.1.3 Desired Dune Characteristics

In coordination with private landowners, the County will seek to plan, permit and implement a continuous dune ridge as a coastal crest with the following characteristics:

1. Dune height of at least +16 feet NAVD;
2. Minimum base width of 200 feet measured perpendicular to the beach;
3. Seaward position of the dune must begin at the line of vegetation or in accordance with the provisions outlined in § TAC 15.7(e);
4. Attain a dune configuration and contour with 575 cubic feet of sand volume per linear foot above the FEMA base flood elevation (BFE);
5. Buffer area of 30 feet landward of the building setback line;
6. Install native dune vegetative cover at a density of one thousand plants in a 50- by 100- foot strip using at least three principal native dune plant species: Bitter panicum (*Panicum amarum*), sea oats (*Uniola paniculata*), and Marshhay cordgrass (*Spartina patens*). Other native dune plant species may be utilized if approved;
7. Install sand fencing landward of the line of vegetation in accordance with the most recent version of the “Coastal Dunes: Dune Protection and Improvement Manual for the Texas Coast.”

4.1.4 Identification of Areas in Need of Restoration

The dune areas in need of restoration are those that lack the dune height, volume, and width specified in the ERP. An assessment of areas in need of restoration was completed in development of the ERP and is included herein and in the Cameron County Erosion Analysis: Study of Future

Shoreline Change and Public Cost Implications of Beachfront Development, TGLO Contract No. 10-103-006, Work Order No. 653, Ravella, P. and W.L. “Bill” Worsham, P.E. (Texas #83152), January 31, 2013.

Generally, dune restoration should take place in areas with a dune elevation of less than 16 feet NAVD88. Specific areas of restoration can only be identified in coordination with private landowners and will be undertaken upon certification and in concert with implementation of the ERP. As site conditions on the shoreline and in the dune system are dynamic, specific areas in need of restoration may change over time.



Figure 9. Dune areas in need of dune restoration (enclosed in red squares).

4.1.5 Enhanced Dune Protection Measures for Existing Structures

No structures have been constructed within the Zone 2 area seaward of the building setback line, or in Zone 3, therefore, enhanced dune protection measures for existing structures are not included at this time.

4.1.6 Seaweed Management

The deposition of Sargassum and other seaweed on the County beaches provides a significant resource for dune restoration activities. The presence of seaweed along the beach is not detrimental to the condition of the shoreline itself but can be a nuisance to beach visitors. The County’s intent is to maximize the benefits that can be obtained by effectively using the seaweed to rebuild dunes, fill dune gaps, and to raise the elevations of the back-beach area, particularly areas prone to washouts and inundation. The County will coordinate with adjacent upland landowners on the placement of relocated seaweed in a mutually beneficial location.

The goal of the County's seaweed management program is to remove depositions of seaweed on the beach only when nuisance conditions occur. In removing and relocating seaweed, the County shall:

1. Avoid and minimize damage to the beach when removing and relocating seaweed.
2. Relocate all seaweed collected from the beach to the foredune area to assist with formation of coppice mounds and to aide in dune formation.
3. Promote the formation of a continuous dune system.
4. Separate the seaweed from the sand substrate through the use of hay rakes (tine equipped) or sand sifting machinery to the maximum extent possible.
5. Restrict the use of bulldozers or similar mechanical blades to clear the beach of seaweed deposition unless seaweed deposition is heavy and cannot be cleared with rakes and sand sifting equipment.

The County will seek to limit the location and timing of its seaweed management practices to those areas that warrant seaweed relocation based on the degree of seaweed deposition and the likelihood of heavy public beach use. Areas that have a higher demand are generally more appropriate for seaweed relocation than rarely used beach areas. The County seeks to limit seaweed relocation to circumstances where seaweed coverage and deposition interfere with the public's use and enjoyment of the beach. This decision is a matter of judgment and experience.

The County will continue to review and adapt its beach management practices to use the most effective methods based on the most up-to-date information.

4.1.7 Limitation of Dune Mowing and Fertilization

Mowing seaward of the building setback line and Dune Protection Line is prohibited. Fertilization may be used during the first year after planting vegetation on the dune to ensure its successful establishment. Approval for fertilizer application will be issued by the County on a case-by-case basis.

Only 12-6-6 fertilizer is allowed at applications rates of not more than 100 lb/Ac and up to four applications during the months of March through May.

4.1.8 Vehicle Restrictions -- Currently, vehicles trespass into the dunes and onto private property from the public beach and from Park Road 100. Vehicles can severely damage dunes, destroy dune vegetation, and contribute to dune weakening, instability, and blowouts. This can increase the risk for storm surge penetration and otherwise undermine the purpose and objectives of this ERP.

As stipulated in the Texas Transportation Code section 750.003, the Texas Natural Resources Code § 63.093, and Title 31, Texas Administrative Code § 15.4(c)(6) no person may operate a vehicle on a sand dune seaward of the dune protection line in any county in which a dune protection line has been established.

To address this issue, the County will seek the permission of the Texas Department of Transportation to place signs along Park Road 100 advising the public that driving on the dunes is prohibited. Violators will be subject to maximum penalties. The County will also recommend that landowners install no trespassing signs on private upland dune areas.



4.2 Procedures for Dune Restoration

All dune restoration activities shall be undertaken only if a Beachfront Construction Certificate and Dune Protection Permit has been duly authorized for the activity and, if applicable, the County has approved an Exemption Petition for construction of a habitable structure seaward of the BSL.

4.2.1 Dune Restoration Phasing – The County will coordinate with beachfront landowners to develop site specific dune restoration plans. The County shall encourage dune restoration projects to be designed and permitted in dune segments of at least 500 feet whenever practicable. Dune restoration priorities, phases and segments will be determined on a case-by-case basis depending on the willingness and cooperation of beachfront landowners to undertake restoration, the length of the dune segment proposed for restoration, the current width and condition of the dune system, the beach width, the project cost, and the financial capability of the applicant.

4.2.2 Coordination - Cameron County will work with landowners to make sure that the implementation of the ERP and the Beachfront Construction Certificates, Dune Protection Permits and Exemption Petitions are followed accordingly.

5.0 CONSTRUCTION PROHIBITION AND EXEMPTIONS SEAWARD OF THE BUILDING SETBACK LINE

The Land Office rules provide that an erosion response plan may include “[a] prohibition on new construction seaward of the building setback line” and that “[t]o the maximum extent practicable, all structures should be constructed landward of the building set-back line” (Texas Administrative Code, Title 31, § 15.17(a)(2)).

Construction of structures landward of the building setback line establishes a rebuttable presumption that a permittee has followed the mitigation sequence requirements for avoidance and minimization of effects on dunes and dune vegetation specified in TAC §15.4(f) of the GLO Rules. However, a permittee is not exempt from compliance with mitigation requirements for unavoidable adverse effects on dunes and dune vegetation.

The remainder of this section describes when and how structures may be built seaward of the building setback line by property owners that have no practicable alternatives.

5.1. Prohibition on Construction of Habitable Structures Seaward of the Building Setback Line and Buffer Area

No habitable structures shall be permitted to be constructed seaward of the Building setback line or within the 30-foot buffer area landward of the Building setback line unless, as provided herein, a Beachfront Construction Certificate & Dune Protection Permit and an Exemption Petition for Construction seaward of the Building setback line are duly filed by the applicant and granted by the County.

5.2 Exemptions from Prohibition on Construction Seaward of the Building Setback Line and Buffer Area: Dune Walkovers and Public Beach Access Facilities

Private and public dune walkovers and public beach access facilities may be constructed seaward of the building setback line and buffer area if authorized under a duly issued Beachfront Construction Certificate and Dune Protection Permit. These dune walkovers will be designed and built as per the “Dune Protection and Improvement Manual for the Texas Gulf Coast” published by the General Land Office (5th edition or most recent; <http://www.glo.texas.gov/coast/coastal-management/forms/files/dune-protection-manual-gpb.pdf>)

Dune walkovers allow access to the beach while reducing impacts to dunes and dune vegetation. Public access facilities designed and constructed by the County are required to provide public access to the beach. By exempting dune walkovers and public access facilities from the prohibition

on construction seaward of the building setback line and buffer, the County seeks to protect the integrity of the dunes, reduce or minimize dune damage and provide for public access to the beach in a manner consistent with federal and state law, the County's Beach Access and Dune Protection Plan, and this ERP. Regardless of such exemption, Cameron County will adhere to all the requirements listed on Section 5.2.1

5.2.1 Requirements for Exempt Construction

Dune walkovers and all public beach access facilities shall be constructed to avoid and minimize impacts to dunes and dune vegetation seaward of the building setback line and buffer to the greatest extent practicable. All impacts to dune vegetation and dune volume, whether for a walkover or public access facility, shall be mitigated seaward of the Building setback line at the mitigation ratio of 1:1 as required by GLO rules and specified below.

Dune walkovers and public beach access facilities constructed seaward of the building setback line and buffer area must:

1. Comply with all applicable requirements, standards and limitations in the County Beach Access and Dune Protection Plan, GLO rules, and this ERP;
2. Be restricted, to the greatest extent practicable, to the most landward point of the public beach;
3. Aligned and sited so as to avoid and minimize impacts to dunes and designed in a manner that does not diminish the integrity of the dune system and foredune ridge or the hydrology of the beach dune system;
4. Located so that the walkovers or public access facilities will not interfere with or otherwise restrict public use of a beach at normal high tides;
5. Be constructed in a manner that allows, to the greatest extent practicable, for the growth of dune vegetation and the migration of dunes under the walkovers;
6. Ensure that all impacts to dune vegetation and dune volume, including vegetation and dune volume under walkovers and access facilities be mitigated at a ratio of 1:1; and
7. In the event that the public beach migrates landward due to erosion or a storm event, the walkover or access facility must be shortened, relocated, or otherwise modified to eliminate any encroachment on the public beach easement. Modifications to walkovers and public access facilities must be undertaken pursuant to a duly issued Beachfront Construction Certificate & Dune Protection Permit.

5.3 Construction of Habitable Structures Seaward of the Building Setback Line and Buffer Zone is Contrary to this Erosion Response Plan

The County has determined that due to high shoreline erosion rates, construction of habitable structures seaward of the building setback line and buffer is contrary to this Erosion Response Plan. In the event that a property owner wishes to construct a habitable structure seaward of the building setback line and buffer, the property owner must apply for an Exemption Petition in addition to a Beachfront Construction Certificate and Dune Protection Permit, and comply with the requirements set forth herein.

5.3.1 Exemption Petition Procedures and Requirements for Construction Seaward of the Building Setback Line

The County shall consider an Exemption Petition for construction of a habitable structure seaward of the building setback line (200 ft landward of the LOV) and buffer area (an additional 30 ft landward of the setback line.) under the following procedures (Checklist provided in Appendix E):

1. In addition to an application for a Beachfront Construction Certificate & Dune Protection Permit, an applicant shall concurrently submit an Exemption Petition for the construction of a habitable structure seaward of the Building setback line and Buffer Area. The Exemption Petition must demonstrate, to the satisfaction of the 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.
2. For projects where the County is considering authorizing an exemption from the prohibition on construction seaward of the building setback line, the Petition and Application materials for construction must demonstrate that the conditions below will be met:
 - a. 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:
 - i. A minimum of two-foot freeboard above FEMA's BFE to the finished floor elevation of the lowest habitable floor;
 - ii. No enclosures below BFE;
 - iii. 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;
 - iv. Feasible relocation of any habitable structure; and

- v. All construction shall be designed to minimize impacts to natural hydrology.
- b. Location of all construction should be landward of the landward toe of the foredune ridge and as far landward as practicable.
- c. The proposed development shall also comply with the current floodplain regulations in the County.
- d. The structure must be elevated on pilings; slab on grade construction is prohibited;
- e. The proposed construction must strictly comply with the requirements of the Cameron County ERP and Beach Access & Dune Protection Plan and the Land Office's Beach/Dune rules set forth in Title 31, Texas Administrative Code § 15;
- f. The use of concrete or asphalt is prohibited under the footprint of the structure and for the construction of a driveway, parking area or road.
- g. In the area seaward of the BSL, all roads, driveways, sidewalks and pathways shall be pervious and constructed with brick pavers, crushed limestone, gravel, or Truegrid pavers.
- h. The applicant will be allowed to place unreinforced fibercrete in 4-foot by 4-foot sections, 4 inches thick, separated by expansion joints, beneath the footprint of the habitable structure, not including the area under decks, only if the fibercrete is not structurally attached to the pilings and placement of fibercrete will be entirely undertaken, constructed, and located at least 25 feet from the landward toe of the foredunes. If no dunes exist, placement of fibercrete may only be undertaken, constructed, and located at least 100 feet landward of the line of vegetation, or landward of the building setback line, whichever distance is greater.
- i. Construction outside the perimeter of a habitable structure using concrete or other impervious surface with an area that does not exceed 5.0% of the footprint of the habitable structure may be authorized. Concrete curbs may be permitted as part of the 5.0% to preserve the integrity of permeable pavers. Curbs shall not be wider than 6 inches or more than 12 inches high/deep; limited concrete pads may also be permitted as part of the 5.0% if required for utilities, and they should be limited to the minimum dimensions required to meet applicable building codes.
- j. Mitigation for damage to dune volume and vegetation shall comply with all applicable standards in the Cameron County Beach Access & Dune Protection Plan, the Land Office Beach/Dune rules, (Texas Administrative Code, Title 31, § 15.4(f)), and this ERP. Mitigation impact analysis shall be further calculated and conducted as follows:
 - i. Dune volume mitigation shall be provided for all dune volume impacted;
 - ii. Dune plant mitigation shall be strictly limited to native dune plants;
 - iii. All dune impacts shall be mitigated on-site to the greatest extent practicable and all mitigation of dune volume and vegetation must occur seaward of the building setback line, even if off-site;

- iv. All dune volume impacted, displaced or disturbed by the proposed construction must be used for mitigation and dune restoration seaward of the building setback line and shall not be used for construction fill or any other purpose;
 - k. Notwithstanding any other provisions, no seawalls, retaining walls, geo-tubes, clay-core dunes, or other structural shore protection projects or shoreline armoring structures may be constructed anywhere seaward of the building setback line.
- 3. In addition to the information required in the Beachfront Construction Certificate and Dune Protection Permit Application, the Exemption Petition shall include the following:
 - a. The site-specific erosion rates seaward of the parcel and at least 1,000 feet on either side of the parcel based on published data from the UT Bureau of Economic Geology;
 - b. A detailed site plan showing all proposed improvements, proposed dune alternations, and pre-construction and post-construction dune contours at 1-foot intervals, and the projected shoreline position, including:
 - i. The surveyed Line of Vegetation subject to review and approval by the Land Office;
 - ii. The surveyed line of mean higher high water (MHHW);
 - iii. The surveyed location of the building setback line and buffer area as defined herein; and
 - iv. The future projected shoreline position at 10, 20, 30 and 50 years from the year of the application, based on multiplying the erosion rate for the parcel times the number of applicable years covering an area of at least 1,000 feet on either side of the parcel and including the parcel;
 - c. A detailed site plan based on a recent survey of the parcel, including the following:
 - i. One-foot dune elevation contours within the parcel and within the area of construction impact;
 - ii. The extent of vegetative cover expressed as a percentage of the area or sub-area and in square footage, (documented by color photos and the survey) on the parcel and within the area of construction impact;
 - iii. Complete calculation of all impacts to dune volume (cubic yards) and dune vegetation (square footage) of the project;

- iv. A dune mitigation plan ensuring mitigation of all impacts to dune volume and dune vegetation will be completed seaward of the building setback line;
- v. The Dune Mitigation Plan shall include:
 - a) a survey of the proposed mitigation area prior to modification;
 - b) Calculation of dune mitigation volume in cubic yards at a ratio of 1:1 of impact. Total dune volume shall be calculated starting at the elevation of the base of the dune within the area of construction impacting the dunes;
 - c) Dune vegetation area in square feet at a ratio of 1:1 of impact;
 - d) The proposed post-mitigation dune shape, location, height, width and contours;
 - e) The proposed dune planting plan including the plant species to be installed on at least one foot on center, the plant source and location within the dune mitigation area, and the location and design of sand fencing, if applicable;
- d. An assessment of the risks to the structure, adjacent structures, utilities, and other improvements in the event of a 100-year storm event if the project is constructed as proposed and taking into account the proposed mitigation plan;
- e. An assessment of the risks to the structure, adjacent structures, utilities, and other improvements due to predicted shoreline retreat determined by multiplying the erosion rate times 10 years, 20 years, 30 years and 50 years;
- 4. Where a Dune Mitigation Plan is required, the applicant shall provide the contact information and addresses for all landowners immediately adjacent to the tract and affirmation that the adjacent landowners will be provided with notice of the County Commissioners Court hearing at least 10 days prior to the hearing on the Application and Petition.

5.3.2 Factors Governing Consideration of an Exemption Petition.

When considering an Exemption Petition, the Dune Protection Committee and County Engineer and Parks Director shall take into consideration the following:

1. The Beachfront Construction Certificate and Dune Protection Permit Application, the Exemption Petition, comments of the public and adjoining owners, comments from the Land Office;
2. The erosion rates seaward of the parcel and at least 1,000 feet on either side of the parcel based on published data from the UT Bureau of Economic Geology,

3. The projected position of the shoreline at 10, 20, 30 and 50 years in the future,
4. The likelihood that the proposed structure may encroach on the public beach in the future;
5. The condition, height, volume, width and extent of the dunes and dune vegetation on the parcel and seaward of the proposed structure;
6. The extent to which the proposed construction will impact dune integrity, including dune volume, shape, height, and dune vegetation;
7. The extent to which the proposed construction would adversely impact the stability, integrity, and resiliency of the dune system, dune hydrology, or cause other environmental impacts,
8. The sufficiency of the petitioner's proposed plan to avoid and mitigate dune and dune vegetation impacts and to improve the dunes seaward of the proposed construction,
9. Any risks to adjacent structures, properties, or public infrastructure, if any;
10. Consideration of whether there are no practicable alternatives to construction seaward of the building setback line, and the availability of alternative construction designs and sites;
11. Such other factors and considerations identified in the petition or as deemed appropriate by the County and generally within the scope of Open Beaches Act, Dune Protection Act, implementing state regulations, and the County Beach Access and Dune Protection Plan, as amended.

After all the previous considerations, the Dune Protection Committee, the Parks Department Director and County Engineer will issue a recommendation to the Commissioners Court, who will issue a decision.

5.4 Review and Action on an Exemption Petition.

1. Completeness and Consistency Review – The Exemption Petition and Beachfront Construction Certificate and Dune Protection Permit Application shall be reviewed by the Cameron County Engineer and/or the Parks Director within a 15-business day period following submission of the applications. If all the required information is contained within the submission and is consistent with this ERP, then the Petition, Application and the applicant's public hearing notice shall be forwarded to the General Land Office for their review. If the Petition and/or Application is incomplete and/or inconsistent, the County Engineer and/or the Parks Director shall make note of such requirements in letters to the applicant within 15-business days of the date of the application submission or resubmittal.
2. Land Office – Following the review by the County Parks Department & Engineering Department, the preliminary determination will be transmitted to the Land Office for review and comment. The County will allow 10 or 30 business days (in case of a large construction project) for receipt of comments from the Land Office.

3. Preliminary Determination by Dune Protection Committee – Once the Land Office has provided comments, the Petition and Application will be presented to the Dune Protection Committee. The Committee may request clarification of the submissions, request additional information, find that changes or modifications to the site plans are required, and shall ensure the Exemption Petition and Application are compliant with all applicable provisions of the ERP, Beach Access and Dune Protection Plan, Beach and Dune Rules, and other applicable requirements. After review, the Committee shall issue a preliminary written determination of consistency with this ERP and other applicable requirements regarding the Exemption Petition and Beachfront Construction Certificate and Dune Protection Permit Application.
4. Recommendation for Commissioners Court Action – Based on comments from the Dune Protection Committee, the County Parks Department & Engineering Department, and the GLO, the Parks Department may place the Petition and Application on the agenda for the Cameron County Commissioners Court with a recommendation to approve, deny, or approve with conditions the Petition and Application.
5. Commissioners' Court Action – Before the 15th calendar day before the date of the hearing, notice of the time and place of the hearing must be published in a newspaper of general circulation in Cameron County. Following public hearing and testimony, the Commissioner's Court may approve, deny, or approve with conditions the petition/application. A written Order will be released within 14 calendar days following consideration by the Court.
 - a) If the petition/application is denied, the petitioner/applicant may request reconsideration by the Court of the Order within 30 days, providing a reasoned justification. In the alternative, the petitioner/applicant may submit a modified application addressing the basis of the denial.
 - b) An Order will become final upon either the expiration of 30 days following issuance, if there is no requested reconsideration or modified petition, or a decision by the Commissioners' Court on a requested reconsideration or a modified petition.
 - c) A final Order on a exemption petition may be reviewed in any court of competent jurisdiction in Cameron County.

All granted Permits and approval of Exemption Petitions are valid for three (3) years and may be renewed for two (2) consecutive ninety-day periods thereafter.

6.0 PROCEDURES TO PRESERVE AND ENHANCE PUBLIC ACCESS

The County operates a system of coastal parks that serve both the residents of the County as well as visitors to the area. The County's park system includes a series of coastal parks that are located along the Gulf of Mexico on South Padre Island. These parks are among the most popular and heavily used in the entire system. These coastal parks are key elements of the Cameron County Parks System.

The County's coastal parks share spectacular locations and provide everyday access to some of the best beaches in Texas. Visitors come to these parks from Texas, the U.S., Mexico, and all parts of the globe. The high level of visitation experienced by the County's coastal parks, combined with the rugged climate conditions, impact the facilities within the parks.

With a view toward improving the park experience for all visitors, the Cameron County Commissioners Court ordered that a coastal parks master plan be developed. Initiated in 2014, completed in May 2015, and updated in May 2016, the plan is a living document used to guide future park improvements. The coastal parks master plan prioritizes improvements needed in the near term to serve the County's existing park users and identifies opportunities for improved recreation and park use in the future.

As mandated by Texas Natural Resources Code § 33.607, Cameron County is committed to developing park improvement plans in a manner that reduces public expenditures for erosion and storm damage losses to public and private property, including public beaches. The County is further committed to ensuring that the upgrades to its coastal parks and public access facilities employ construction methods and designs that will reduce post-storm repair costs. The new park improvements are subject to the Beach Access and Dune Protection permitting process, and specific designs will be reviewed and evaluated with the full participation of the Land Office as the park improvement designs are developed and advanced through the permitting process.

This ERP includes a general schedule for public access design improvements which will be updated on an on-going basis as improvement designs are advanced. The inventory of existing access facilities to support future FEMA post-storm funding claims was completed as part of the coastal parks master plan and will continue to be updated as designs for new facilities move forward. The updated inventory will be completed in 2019. Finally, this ERP establishes post-storm beach access assessment procedures so that future damages can be catalogued.

6.1 Evaluation of Current Public Access Facilities

Through the coastal parks master plan process and this ERP, the County has evaluated the condition of existing beach access improvements and assessed their vulnerability to damage from erosion and storm events. Cameron County is in the process of amending its Dune Protection and Beach

Access Plan that assesses the needs for public access improvements to preserve and enhance the public's right to access and use the public beaches fronting along the Gulf of Mexico. Currently, the beaches in Zones 1, 2, and 3 are accessed by driving onto the beaches. Portions of Zone 1 and Zone 2 beaches seaward of Park Road 100 are pedestrian only and the County (See Appendix D) will continue to work closely with the Land Office to ensure upland parking areas, access fees, and facilities are in compliance with state access standards. The County will ensure, in partnership with the GLO, that all public access points, including necessary parking areas, are consistent with state standards.

There are currently seven existing beach access points that are owned and maintained by Cameron County. Three of the seven access points have public facilities and improvements. The remaining four access points are unimproved and provide off-beach parking areas. The County's three improved beach access parks are Isla Blanca Park, Andy Bowie Park, and E.K. Atwood Park. The County Coastal Parks Master Plan included conceptual plans for improvements to the three improved beach access parks. These parks will be upgraded and improved in 2017-2019 following authorization of a \$30 million park improvement bond.

The main goals of the coastal parks master plan are to provide quality amenities and public access to serve the high volume of visitors to the parks. The coastal parks master plan creates a road map for both short term and longer-term improvements to all the coastal parks. It guides the new development of facilities in each park and responds to new opportunities and events that may take place on the island with its growth. Park improvements under consideration and development at this time include:

- Improved park entry areas
- New or improved restrooms
- Traffic circulation improvements at Isla Blanca and Andy Bowie parks
- Expanded day parking areas
- Improved RV parking at Isla Blanca and Andy Bowie parks
- Improved maintenance facilities
- Improved concessions, picnic/shade pavilions, rental cabanas
- Special attraction facilities (i.e. SpaceX rocket viewing areas)

With extensive Land Office involvement, the permit to improve E.K. Atwood Park was issued and the project was completed in early 2018. Improvements to Isla Blanca Park and Andy Bowie Park are in the design phase at this time and will be subject to full Land Office review through the Beach-Dune permitting process.

The ERP recognizes that public access facilities are permitted to be located seaward of the Building setback line in Zone 2. However, in the park improvement designs under development at this time, Cameron County has incorporated design standards and objectives specifically intended to reduce

potential public expenditures for erosion and storm damage losses and will work closely with the Land Office to review these designs to ensure risks to storm damage and losses are minimized to the greatest extent possible. In the development of coastal park improvements, the County will:

1. Avoid and minimize impacts to dunes and dune vegetation to the maximum extent practicable;
2. Fully account for any dune and dune vegetation impacts from park facility improvements and ensure full on-site dune mitigation and restoration at a 1:1 ratio;
3. Employ permeable parking surfacing materials such as TrueGrid system for all new parking area and pathways, to the maximum extent practicable;
4. Locate new parking areas to avoid and minimize dune impacts and in a landward location to the maximum extent practicable;
5. Elevate new park facility structures above base flood elevation; and
6. Ensure dune walkovers are located as far landward of the public beach easement while ensuring adequate public access.

The updated inventory and evaluation below serves as the basis for improvement priorities and determining appropriate funding for projects and FEMA post-storm funding qualifications.

• **Beach Access 1, Isla Blanca Park** - Located at the south end of the island adjacent to the Brazos-Santiago Pass, Isla Blanca Park includes direct access to approximately 3,150 feet of Gulf beach and 3,500 feet of access along the Brazos Santiago Pass shoreline. Isla Blanca has facilities for a wide variety of activities for all ages and beach goers. It includes a public boat launch, making it a favorite for fisherman along with the mile long jetty and bay area beach access. There are more than 600 RV sites and 933 paved parking spaces inside Isla Blanca Park that receive an annual influx of residents during the cooler months and weekend residents during the summer months. There are two large pavilions with concessions, restrooms and rinse stations where summer users like to relax and picnic in the shade just a few steps from the beach. The Dolphin Cove area is used primarily for gatherings and group events.

Today the park is heavily used year-round and although the facilities are adequate, much of the park is showing the toll from heavy use and needs renovation and upgrades. This will not only improve the quality of user experience, but also continue to provide a cost-effective location for beach-going families, RV park enthusiasts, and fishermen.

The park includes an existing sea wall and intermittent and irregular dune field that is up to 200 feet wide in some locations. The dune system is in need of enhancement and protection from visitor impact and development of the dune improvement plan is underway as part of the overall park facilities improvement design, which is scheduled to be completed in the second quarter of 2020.

Isla Blanca park facilities have deteriorated over many years due to the wear and tear expected

from heavy public use, occasional stormy weather, and the mostly sunny salt air seaside environment. Park facility structures have to be able to withstand heavy public use, heavy weather events, and the maintenance challenges presented by the seaside environment. All existing facilities are candidates for replacement or expansion, but there are several other amenities that the park is lacking in order to make the user experience the best it can be for all groups that visit the park.

1. Park circulation and parking
2. Entry gate improvements
3. Proposed park gateway feature
4. Restroom facility improvements
5. Large pavilion improvements
6. Picnic pavilion improvements
7. RV site improvements
8. Proposed beach boardwalk
9. Rental cabana improvements
10. Dolphin Cove peninsula improvements
11. Other park amenities improvements under development
12. Playground Improvements
13. Sea Ranch area improvements
14. Concession improvements
15. Boardwalk, rinse stations and dune walkover improvements

Beach access and dune impacts of the Isla Blanca Park improvements and consideration of storm impact risks were fully assessed and addressed in consultation with the Land Office in the design and permitting process.

• **Beach Access 2, Andy Bowie Park** - Located approximately a half-mile inside the northern city limits of the City of South Padre Island, Andy Bowie Park has a half-mile of beach with 301 paved parking spaces, concession buildings, two pavilions, two restroom and shower facilities, a toll collection booth and a park ranger station. The park has a dune field that is some 400 feet wide with two pedestrian paths through the dunes.

This area is the second most popular county coastal park on the island. It is a popular place for families and day users as well as RV enthusiasts that want a more secluded campsite. It does not have automobile access to the beach, but for many beach goers that is a positive aspect of the park. The land owned by the county also includes the Convention Center as well as the adjoining sand flats on the Laguna Madre side of the island.

Andy Bowie Park is strategically located near the proposed Causeway location, and as such is

anticipated to have increased numbers of visitors when the second causeway is built.

Existing site and facilities- Amenities at this park are more extensive than other beach access points in the area, but are still fairly limited. There are adequate restrooms and a shade pavilion, but the majority of the users are solely there for access to a less populated beach experience, which is only a short walk from the parking area. The 18 RV sites are somewhat less exclusive than the Isla Blanca sites, but include their own restroom facility and beach access and shade pavilion. The sand flats area is used year-round for fishing and kite surfing and is a natural tidal area.

Just south of the park, but included with it, is the Hilton Garden Inn, which is developed on park lands that have been leased from the county. It is a full-service hotel that many of the park users of this park prefer because of its convenient location.

Key park needs – Cameron County is currently evaluating, planning and designing specific improvements to Andy Bowie Park. As specified above, the park design will locate new facilities landward of the foredune ridge, employ pervious surfacing materials such as TrueGrid for parking and pathway areas, and include strategies to avoid and minimize impacts to dunes and dune vegetation. Dune impacts will be mitigated on-site at a ratio of at least 1:1. Based on the coastal parks master plan, expected improvements are likely to include:

1. Increased Parking – The county seeks to increase the number of parking spaces within Andy Bowie Park in areas landward of the foredune ridge.
2. Restroom Renovations – Restroom and changing facilities are generally adequate, but are dated and dark. While retaining the existing structure, upgrades to furnishings, fixtures, lighting and entryways are expected. The restroom roof structures will be updated to adopt the architectural theme selected for Isla Blanca Park. Solar and wind energy features may be added to generate power for additional lighting in the park restrooms.
3. Pavilion Enhancements – The existing pavilion is generally in good condition and offers good views of the beach. The County is considering replacement of the pavilion shade structures to increase the shaded area and provide more roof support reinforcement.
4. Park Entry Building Renovations – Restorations to the entry building are expected, including upgrades to air conditioning units and the replacement of windows and roofing. A second entrance lane is expected to be included for peak visitation periods.
5. Main Access Walkover – The County will replace pavement to the main access pathway and replace the path with one or more ADA compliant walkovers.
6. Concession Building Renovation – Interior renovations to the concession building are expected to attract new concessions to the site. Additional shaded eating areas on either

side of the concession building should be developed.

Many of the proposed improvements for Andy Bowie Park are similar to those at Isla Blanca Park, just on a smaller scale. The current facilities are adequate but rapidly aging. Additional public parking is needed. Parking, shade pavilion, and restroom facilities will be updated or expanded to accommodate the growing number of users. The RV sites will be improved along with increasing the number of spaces to meet increased demand. There is also an opportunity to create cabanas for overnight rentals for visitors to stay in for the weekend. The beach area is beautiful in its current condition. An improved boardwalk and access to the beach would improve its accessibility, and there is also an opportunity to add small rental pavilions along the beach for day use. Expected facility upgrades to Andy Bowie Park will be finalized in the design and permitting process and likely to include:

1. Beach access walkover(s)
2. Parking areas upgrade and increased capacity
3. Pavilion and restroom facility improvements
4. Entry gate improvements
5. RV site improvements and expansion from 18 to up to 70
6. Restroom and pavilion facility improvements
7. Investigation of potential fishing pier
8. Park ranger station improvements.

• **Beach Access 3** - Located north of the city limits and approximately a quarter-mile north of Andy Bowie Park, Beach Access 3 offers pedestrian beach access via a dune walkover and has approximately 143 unimproved parking spaces. Free access is provided during non-peak season, which is immediately after Labor Day through the last day of February. The rest of the year a BUF is enforced.

Through the coastal parks master plan and working with the Dune Protection Committee and in consultation with the Land Office, the County is planning to improve Beach Access 3. The improvements are currently in the preliminary design stage, and the schedule for improvements to this access point has not been finalized at this time. Likely improvements include:

1. Shade pavilion
2. Restroom facility
3. Community rinse stations
4. Expand and improve pervious parking area
5. Upgrade the existing beach access walkover
6. Dune restoration and enhancement

Beach Access 4 - located 1-mile north of Andy Bowie Park. This is not a vehicular accessible access point, but allows public pedestrian access to the beach. This access area provides 54 (49 regular and 5 ADA accessible) public Gulf-side parking spaces and 66 spaces on the west side of Park Road 100. This access area provides an ADA accessible dune walkover with interpretive signs that allows access to the beach. The dune walkover was funded with the assistance of the Texas General Land Office CMP program. The total construction cost for the dune walkover was \$180,533.00, split between CMP Funds: \$96,000 and County funds: \$84,533.00. This beach access area also provides police surveillance, seasonal lifeguards/beach patrol and portable restrooms. Cameron County has plans in the near future to extend water and sewer services to this beach access for the development of restrooms and rinse stations.

- **Beach Access 5, E.K. Atwood Park** - located approximately 1.6 miles north of Andy Bowie Park and being a vehicular beach accessible point, but allows public accessibility to this beach access through all-weather roads with approximately 128 public Gulf side parking spaces, including 5 ADA parking spaces, and 4 food truck parking concession spaces; and 58 spaces on the west side of Park Road 100. Facilities provided at this park or access point number five are: public restrooms, five (5) large covered pavilions with picnic tables, community rinse stations, two ADA accessible dune walkovers, police surveillance and seasonal lifeguards/beach patrol. *Free parking is provided directly across this park on the bay side (West) of Park Road 100. On average 100,000 passenger cars and motorcycles, and 10 busses visit this park and beach access each year.

- **Beach Access 6** - The County Park Department provides vehicular beach access through Access Point Number Six (6) located 4.5 miles north of Andy Bowie Park which provides only seasonal roadway maintenance and staffing for public safety, security and emergency purposes. Free access is provided during non-peak season, which is immediately after Labor Day through the last day of February. The rest of the year a BUF is enforced. On average 24,000 passenger cars and motorcycles, and 10 buses visit this access point.

- **Beach Access 7** - Located on Brazos Island where State Highway 4 (Boca Chica Boulevard) ends on Boca Chica Beach. This is a free vehicular access point with no structures. The County intends to maintain this access as a vehicular access point. No new facilities are anticipated at Beach Access 7 at this time.

6.2 Access Improvements: Isla Blanca Park, Andy Bowie Park, and E.K. Atwood Park

The following table shows the proposed beach access improvements goals and schedules for overall access improvements and management and park improvements to Isla Blanca Park, Andy Bowie Park, and E.K. Atwood Park. This schedule is subject to modification as the planning process continues. Design and permitting for improvements to E.K. Atwood Park have been

completed and construction is expected to be completed in 2018. In all cases, park and access improvements will be undertaken in coordination with the Dune Protection Committee and in consultation with the Land Office, following the planning guidance in the coastal parks master plan. All improvements must be permitted consistent with the requirements of the County's Beach Access and Dune Protection Plan and in coordination with the Land Office.

All access improvements will be designed and constructed in a manner to reduce costs related to maintenance, repair, and replacement. Structures will be located as far landward as possible and, where applicable, will be raised above the base flood elevation. The designs will avoid and minimize impacts to dunes and dune vegetation and mitigate any remaining impacts on-site. Dune walkovers will be accessible under the Americans with Disabilities Act and will be designed to minimize shading of dune vegetation and to strictly avoid encroachment on the public beach. Parking areas will be constructed with pervious parking using TrueGrid or a similar pervious paving system, where practicable. Any new or improved vehicular access road will, if feasible, incorporate a raised berm to minimize the chance of a washover through the roadway.

The Land Office has adopted rules for the creation of pedestrian beaches that require that the county construct a public beach access area and parking area no more than a half-mile apart with one parking space required for each 15 linear feet of pedestrian beach (see 31 TAC §15.7(h)). Closure of a half-mile of beach to vehicles (2,640 feet) would require 176 parking spaces on either end of the pedestrian beach. An average parking area for 176 spaces including entrance and exit lanes and two handicap parking spots is one acre. If the beach access way is to include restrooms and other amenities, an allotment of at least an additional one and a half acres is expected. Access ways for pedestrian beaches may be constructed prior to or concurrent with the development of upland areas adjacent to a proposed pedestrian beach. Pedestrian beaches should be implemented gradually in stages as new beach access ways are constructed. This will also provide beach users with time to transition to a pedestrian only beach and will be easier to regulate. Bollards would be used to separate pedestrian beaches from vehicular beaches.

6.3 Schedule for Access Improvements

Cameron County Erosion Response Plan	
Table 2: Public Access Improvement Goals and Schedule	
Goal 1	Maintain and improve public access while reducing risks of storm damage to public access facilities
Goal 2	Complete and implement plans to upgrade Isla Blanca Park, Andy Bowie Park & EK Atwood Park
Goal 3	Expand pedestrian beach area in Zone 2 in a manner consistent with state requirements and GLO certification of BD Plan amendments
Goal 4	Maintain Vehicular Access to Boca Chica Beach; evaluate potential access facility improvements
Goal 5	Monitor and maintain dunes seaward of all County beachfront parks and access points
Item	Within 2 Years of Plan Certification

1	Advance Public Beach Access Planning
	1.1 Develop off-beach parking plan for progressive expansion of Zone 2 pedestrian beaches in line with OBA, DPA and applicable rules
	1.2 Update inventory and evaluation of all public beach access facilities as improvements are made
	1.3 Reevaluate and improve Beach Access 6 as a vehicular access point
2	Complete construction of Isla Blanca improvements.
3	Complete Design and Permitting of Isla Blanca Park Improvements
Item	Within 3 to 5 Years of Plan Certification
1	Evaluate potential properties for new upland parking areas between Beach Access 5 & 6
2	Evaluate improvements to public access facilities on Boca Chica Beach, initiate planning and design if warranted
Item	Within 6 to 8 Years of Plan Certification
1	Depending on funding availability, undertake gradual and coordinated expansion of pedestrian beach area in Zone 2 up to Beach Access 6
2	Assess improvements to Beach Access 6 facilities, assess needs for vehicle access & parkingComplete Design and Permitting of Andy Bowie Park Improvements (depending upon funding availability)
3	Complete Design and Permitting of Andy Bowie Park Improvementsimprovements at Beach Access 3 (depending upon funding availability)
4	Complete Design and Permitting ofEvaluate improvements atto public access facilities on Boca Chica Beach Access 3 (depending upon funding availability), initiate planning and design if warranted

Under this plan, the County will keep the north beaches in Zone 3, the beaches beyond the end of Park Road 100, as vehicle accessible, drive-on beaches. Presently, the County provides and will continue to maintain vehicle access through Beach Access 5, E.K. Atwood Park, and through Beach Access 6; however, in the future vehicle access plans may be modified, and additional pedestrian beach areas created, if upland parking areas can be identified, secured, and improved consistent with state law.

The County recognizes that approval from the Land Office is required before the County may modify beach access, close a public beach to vehicles, or expand pedestrian beach areas. At this time, the County is not proposing to expand pedestrian beach areas. Should such modifications be desirable, the County will prepare beach access improvement and vehicular control plans in accordance with state law and, if approved by the Commissioners' Court, submit the plans to the Land Office for review and certification.

6.4 Post-Storm Monitoring

In the event of a tropical storm or other significant meteorological event impacting the beach, the County will conduct a preliminary inspection of all beach parks and access points within ten days after it has been found safe to return to the beach. Access facilities will be inspected in order of

priority based on the facilities present at the access point and the degree of impact sustained. Priority will be given to the assessment and inspection of Isla Blanca Park, Andy Bowie Park, and E.K. Atwood Park, and Beach Access 3 as these access points include facilities, structures, and/or improvements. Preliminary inspection of all access points, including parking areas, walkovers, and dunes, will be completed within ten days following a storm event.

The County Parks and Engineering department will oversee, direct and manage post-storm inspection and assessment activities and regularly update the Commissioners Court on all actions. Coordination with appropriate state and federal agencies, particularly the Land Office, Division of Emergency Management, and FEMA, will be undertaken in accordance with applicable post-storm procedures.

In the post storm inspection and assessment, the County will:

1. Within ten days of the storm event-
 - a. Inspect the structural integrity and condition of all improvements, including but not limited to structures, restrooms, showers, pavilions, roadways, RV pads, utilities, parking facilities, walkovers, beach access pathways, and the dune system;
 - b. Document any facilities in unsafe condition and order and schedule, if warranted, additional engineering inspections or surveys;
 - c. Undertake emergency repairs or, if necessary and after consultation with the Land Office, temporarily restrict access to facilities deemed unsafe so as to ensure public health and safety;
 - d. Identify any structures, walkovers, or facilities within the public beach easement or that otherwise restrict and/or interfere with public use and access to the beach and immediately notify the Land Office in writing;
2. Within 30 days of the storm event-
 - a. Prepare a preliminary plan to repair, remove, and and/or replace impacted facilities including cost estimates, documentation, and engineering reports;
 - b. Specifically determine if removal and/or modification of dune walkovers, structures or facilities is warranted due to encroachment on the public beach easement and notify the Land Office thereof;
3. Within 60 days of the event or as soon as reasonable, refine facility repair or replacement costs and assess the funding available to carry-out the needed repairs;
4. If appropriate and available, prepare requests for financial assistance in accordance with state or FEMA post-storm recovery procedures;
5. Identify funds and/or opportunities for funding through local funds, grants, capital improvement reserves, or other sources to undertake repair of public access facilities;

6. As expeditiously as possible and in accordance with permitting and regulatory standards and procedures, develop a priority and schedule to design, permit and implement beach access facility repairs based on available funding.

Given the wide range of potential storm impacts, including major hurricanes, the post-storm inspection and assessment procedures included herein are necessarily subject to modification.

7.0 ERP IMPLEMENTATION

7.1 Conceptual Funding Strategy

As the strategies and schedules for implementing the ERP are refined, the County will seek to develop a funding strategy to support implementation of the ERP. In general, the County will seek to develop a funding plan that broadly reflects the following principles:

- Seek to develop a long-term funding strategy that is stable, predictable, and sufficient to support current and future shoreline management needs.
- Seek to maximize state and federal support for the County, particularly seeking on-going CEPRA and CMP grant funds whenever possible as well as RESTORE Act grants, state and federal hazard mitigation grants, and similar funding sources.
- Seek to work cooperatively with property owners who wish to develop a property in a manner consistent with this ERP.

7.2 Acquisition of Parcels Seaward of the Building Setback Line

The County has developed criteria for identifying properties for voluntary acquisition of fee simple title or a lesser interest acquisition by donation. In general, land parcels which are located entirely seaward of the building setback line, in blowout areas, or are sparsely or irregularly vegetated are a priority for acquisition. Large, contiguous parcels extending from the beach and landward past the building setback line are also a priority for acquisition.

In Zone 2, several of the tracts have been subdivided so that some parcels may be wholly seaward of the building setback line. The state rules allow local governments to develop criteria governing the voluntary acquisition or buyout of beachfront parcels. Currently, there are no habitable structures seaward of Park Road 100 in Zone 2. In evaluating any undeveloped parcels to be acquired, the County will consider the following factors:

1. Whether the parcel has been subsumed into the state-owned submerged lands beneath the Gulf of Mexico.
2. Whether the parcel is subject to the public beach easement.
3. Whether the parcel is in or adjacent to a public beach access point or an area proposed as a pedestrian beach, and
4. Whether acquisition of the parcel would further a dune restoration or beach nourishment project.
5. Whether the parcel falls seaward of the Building setback line.

In addition, the County declares as a policy for acquisitions to:

1. Accept land donations for property located seaward of the Building setback line,
1. Accept land donations for future public beach access,
2. Seek exchanges of development rights where feasible, such as along the right-of-way for Park Road 100, and

The County's acquisition process will generally consist of the following steps:

1. Coordination with willing landowners
2. Assess level of interest in voluntary donation to the County
3. Identification of potential property for acquisition
4. Negotiation of terms of acquisition
5. Identification of available funding including potential grants,
6. Agreement to acquire
7. Execution

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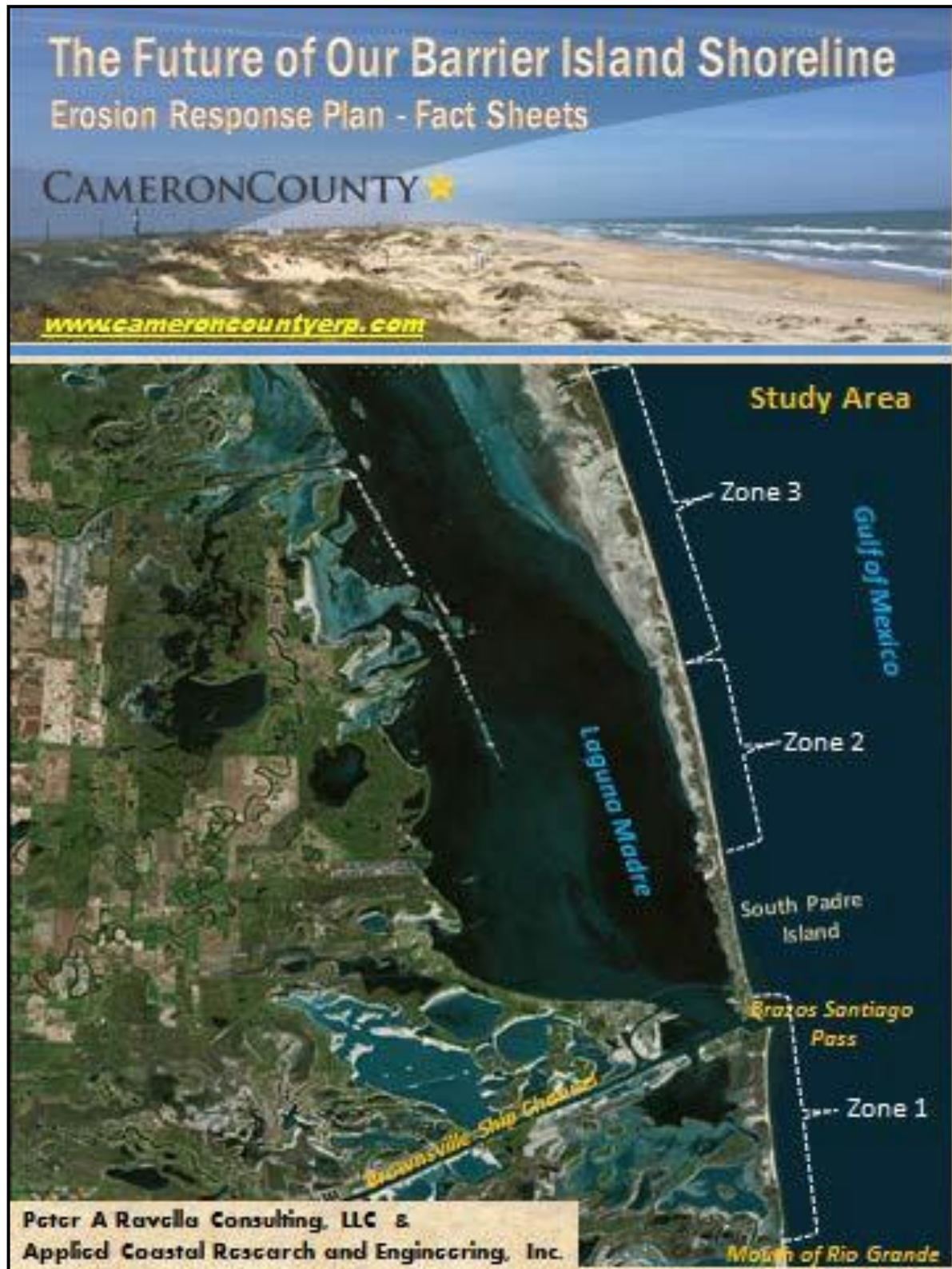
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Appendix A –Draft ERP Fact Sheets





Erosion Response Plan

Cameron County, Texas

Managing Beach Erosion

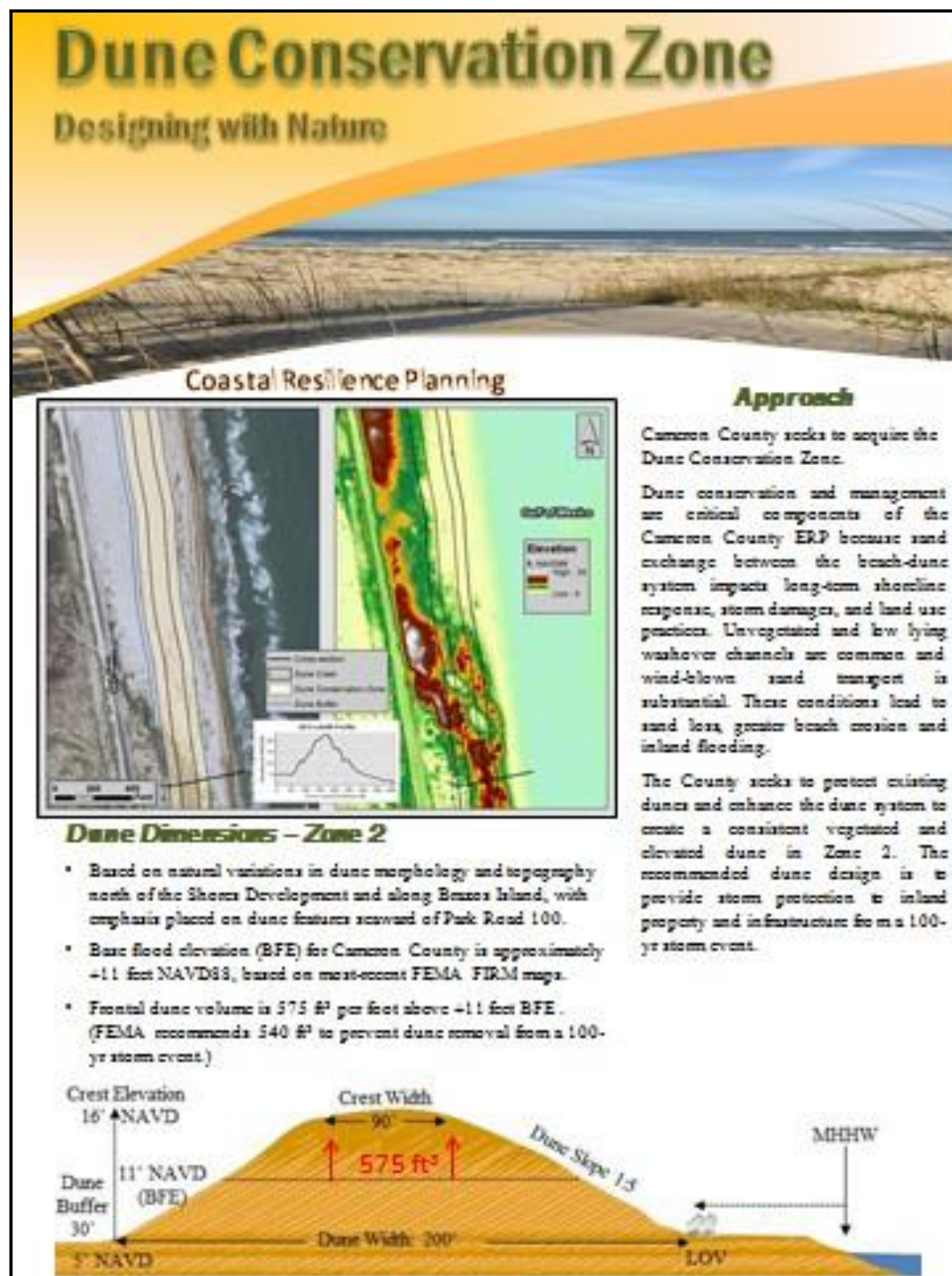
Develop effective shoreline management strategies for the general safety and welfare of the beach-going public and coastal property owners, and to reduce costs resulting from storm damage to public infrastructure and private property.



For the Cameron County Erosion Response Plan (ERP), Gulf beaches and dunes are divided into the three zones:

- **Zone 1 - Boca Chica Beach:** The beach and dune area includes Isla Blanca Park and the beach south of Benzo's Santiago Pass to the Rio Grande, where there is limited potential for residential development. This zone has a long-term erosion rate of approximately 5 feet per year. It also is the site of the planned Space X launch facility.
- **Zone 2 - Park Road 100:** The beach and dune area north of the City of South Padre Island to the end of Park Road 100, a distance of approximately 6.4 miles. This zone has a long-term erosion rate of about 10 feet per year and is the area most likely to be developed in accordance with shoreline management strategies set forth in the ERP.
- **Zone 3 - North Beaches:** The beach and dune area north of the end of Park Road 100 to the County line. This area experiences long-term erosion rates of approximately 12 feet per year and has no utilities or road access. This is the highest risk shoreline in the county and will likely be the most costly to manage. Zone 3 is suitable for beach driving.

Management Goals

- 1) Ensure public beach access and respect private property rights within the context of established shoreline management strategies aimed at coastal resiliency, economic feasibility, and public safety.
- 2) Use form and location of natural features for coastal resiliency design.
- 3) Develop beach and shoreline management strategies based on long-term survey data.
- 4) Establish a Dune Conservation Zone for storm protection and beach erosion management.
- 5) Establish vegetated dune systems, consistent with existing natural dunes, to enhance sand trapping and exchange between dune, beach, and nearshore environments.
- 6) Reduce risk through erosion management planning.



Erosion Response Plan

Cameron County, Texas

Management Options

- 1) Continue coordinated efforts between Cameron County and the City of South Padre Island to beneficially use sand removed from Brazos-Santiago Pass for preserving and restoring beaches.
- 2) Implement shoreline management strategies that enhance coastal resilience.
 - Establish dune systems consistent with resilient natural dunes, and implement dune strategies to maximize sand trapping (e.g., vegetative planting and sand fencing).
 - Establish sand management strategies to reduce long-term beach erosion rates (e.g., beach restoration).
- 3) Establish a Dune Conservation Zone north of the City of South Padre Island.
 - Provide a beach erosion risk buffer between public beach and private development, consistent with the existing natural dune systems.
 - Work with private property owners and regulators to establish construction exemptions that will not jeopardize the integrity of erosion management strategies aimed at reducing risk.
- 4) Relocate Park Road 100 to improve coastal resilience.
 - PR 100 is at high risk and maintenance costs are substantial due to close proximity to the active beach/dune system, with windblown sand transport and dune migration across the road.
 - The shoreline fronting the road erodes at a rate of approximately 10 feet per year. Present road alignment is vulnerable to flooding during storms, even storms that do not make landfall in South Texas.
 - Location of Park Road 100 interferes with erosion management strategies where the Dune Conservation Zone is on or in close proximity to the road/development footprint, magnifying infrastructure risk concerns.
- 5) Preserve and enhance public access
 - Acquire new access ways, spaced ¼ to ½ mile apart
 - 88 to 100 off-beach parking spaces per access
 - Create dune walkovers
 - Phased implementation - convert Zone 2 to a pedestrian beach as public access points are acquired and improved

The Future of Cameron County's Barrier Island Shoreline

Special Opportunities, Risks, and Need for Pro-active Partnerships

Cameron County Erosion Response Plan

Fact sheet

05/24/2008



"By working together as a region combining and coordinating local, state and federal resources, we will directly address ongoing threats to the Texas coast for future generations."

- George P. Bush, Texas Land Commissioner

Development of a comprehensive and stakeholder-driven ERP can provide the basis for long-term sustainable resource use and protection. Given the strategic importance and intrinsic appeal of living along the Texas coastline, local, state, and federal government entities should continue to invest in restoration and protection plans with the aim of reducing long-term environmental impacts while continuing an appropriate level of economic sustainability. However, in practice, many of these coastal zone activities have resulted in greater shoreline vulnerability and less resilience due to lack of a unified vision and uncoordinated efforts related to planning and management of sediment resources.

Our situation in Cameron County is unique. Our barrier island beaches include the longest privately held and undeveloped Gulf shoreline in Texas. This shoreline presents tremendous opportunities for public use and future development, but these same beaches are eroding at more than 10 feet per year, one of the highest rates in the state. Along with other coastal communities, the Cameron County shoreline encapsulates the great risks and opportunities for future development on barrier islands.

Cameron County is ready to work with you – our State and Federal partners – to accomplish these critical goals if we are to responsibly realize the promise of our coast.

Unique opportunity

A chance to explore how we can best address the long-term costs of beach erosion management, dune restoration, and protection of public infrastructure.

- Longest undeveloped stretch of barrier island in U.S.
- New causeway from the mainland
- Space X coming to Boca Chica
- Potential for economic growth
- Myriad of funding mechanisms available over the next 15 years

Funding Options

- State CERP & CMP from GLO
- NFWF
- Restore Act & NRDA (BP Spill)
- FEMA HMGP
- Local Special District Taxes (PID)
- Other



Appendix B – Shoreline Methodology

Six outer coast shoreline datasets were used for documenting historical shoreline change for the Cameron County coast between the Rio Grande (south) and Mansfield Pass (north) for the period 1854/67/80 to 2014. Shoreline change was quantified for four time periods specific to natural processes and engineering activities influencing the magnitude and direction of change.

Shoreline source data characteristics.		
Date	Data Source	Comments and Map Numbers
1854/67/80	USC&GS Topographic Maps; 1:20,000	First regional shoreline survey throughout study area using standard planetable surveying techniques; 1854 - Rio Grande to Brazos Santiago (T-453); 1867 - Brazos Santiago entrance northward (T-1045), 1880 - Padre Island (T-1476a, T-1476b, T-1477a, T-1477b).
June 1939	USC&GS Topographic Maps; 1:10,000 (T-6707), 1:20,000 (all others)	Second regional shoreline survey throughout study area using standard planetable surveying techniques; June 1939 - Rio Grande to Boca Chica (T-6704b), Brazos Santiago (T-6707), Padre Island (T-6706a, T-6705b, T-6705a, T-6704b).
February 1995	Aerial Imagery; 1-meter resolution	Digital Ortho Quarter Quads (DOQQs) interpreted by Applied Coastal; February 1995 - Rio Grande to Padre Island.
May 2014	NAIP Aerial Imagery; 1-meter resolution	National Agriculture Imagery Program (NAIP) digital orthoimagery interpreted by Applied Coastal; 4 May 2014 - Rio Grande, Brazos Santiago and South Padre Island, 15 May 2014 - Padre Island north of Long Point.

The first four surveys were compiled by the U.S. Coast & Geodetic Survey (USC&GS; presently the National Ocean Service [NOS]) in 1854, 1867, 1880, and 1939. The 1995 shoreline was interpreted from Digital Ortho Quarter Quads (DOQQs), and the 2014 shoreline was derived from National Agriculture Imagery Program (NAIP) high-resolution orthoimagery. Digital shoreline data for 1854/67/80 and 1939 were compiled at Applied Coastal from scanned USC&GS topographic sheets using techniques described in Byrnes and Baker (2003) and Baker and Byrnes (2004). The 1995 and 2014 shorelines were delineated as the interpreted high-water shoreline (wet/dry line) from imagery. The high-water shoreline is recognized as the landward limit of wave runoff at the time of local high tide. Finally, utilizing techniques described by Byrnes et al. (1991)

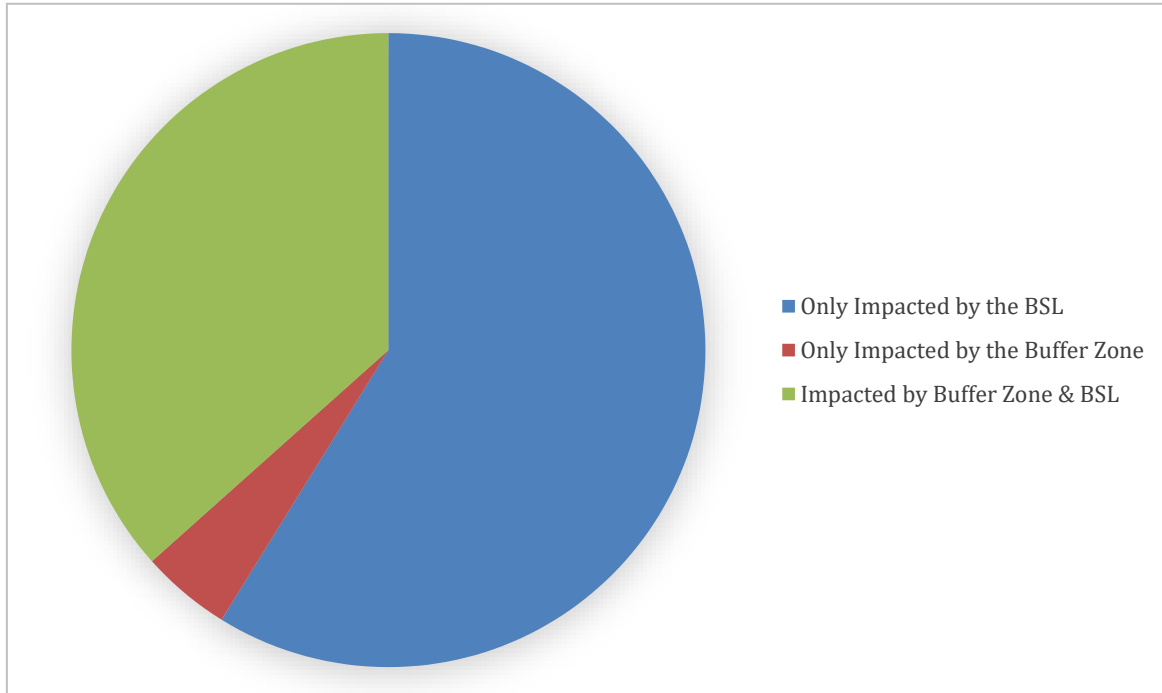
and Byrnes et al. (2012), a computer-based shoreline mapping methodology, within a GIS framework, was used to compile and analyze changes.

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Appendix C – Properties Potentially Affected by Building setback line

A preliminary review was conducted to determine what properties may be affected by the building setback line. The results of that preliminary review are summarized below.



ERP Parcel Categories		# of Parcels	Percent
Building Setback Line & Buffer Zone Impacts	Only Impacted by the BSL	90	59%
	Only Impacted by the Buffer Zone	7	5%
	Impacted by Buffer Zone & BSL	56	37%
	Total	153	100%

Orientation of Parcels	Parcels >25' landward of buffer	56	31%
	Parcels wholly outside buffer	25	14%
	Parcels within buffer & BSL	13	7%
	Parcels wholly seaward of BSL	84	47%
	Total	178	100%
CONCLUSION: There are a total of 81 parcels (45%) that are partially affected by the buffer and building setback line in place.			

All measures are approximate; based on Cameron County appraisal parcels displayed in Google Earth.

Appendix D – Coastal Cameron County Regional Coastal Setting

Cameron County is the southernmost county of Texas. The County coastline is approximately 35 miles (mi) long, bordered to the north at the Willacy County line, to the west by the Laguna Madre estuary, and to the south by the Rio Grande River outlet/Mexican border (Figure 4). The county coastline divides into two sections at the Brazos Santiago Pass (BSP) jetties; an inlet between the Gulf of Mexico and the lower Laguna Madre allowing ship traffic to access the Gulf Intracoastal Waterway and Brownsville Ship Channel. Within the southern portion of Cameron County lies the City of South Padre Island (SPI), a low lying and relatively narrow barrier island community that extends approximately 6 mile north of Isla Blanc Park. South of Isla Blanca, the County extends for approximately 8 mile terminating at the ocean outlet of the Rio Grande.

This ERP is primarily focused on two undeveloped areas of Cameron County: the shoreline 8 miles south of Isla Blanc Park, just north of BRAZOS SANTIAGO PASS (Zone 1) and a 20 mile portion north of SPI within its Extra-Territorial Jurisdiction (ETJ) (Zones 2 & 3) (Figure 4). These geographical delineations for the ERP stem from the fact that SPI has an approved ERP, and thus recommendations for the Cameron County ERP will not include that area. The SPI ERP was adopted and implemented in 2012, and addresses erosion and storm risks within the current city limits, excluding the undeveloped areas in the ETJ.



Figure 4 Cameron County borders and the ERP boundary

The Texas coast encompasses four major climatic zones. Cameron County is located in the subtropical, semi-arid climate zone (Figure 5). This part of the Texas coast receives less rainfall and has experienced prolonged droughts that have affected the growth/development and viability of coastal vegetation that help hold sand in place within the beach-dune system. Climatic diversity controls regional variations in net annual precipitation. Average annual rainfall minus potential evapotranspiration reveals the more humid northeast portions have +12 inches/year (in/yr) in contrast to the semiarid south of -28 in/yr (Fisher et al. 1972).



Figure 5 Climatic Zones of Texas (from Morton 1994).

The project area originated from sediments eroded from the Rio Grande Delta roughly 3,400 to 1,900 years before present (Brown and Hartmann 1980). Reworked by waves and currents, sediments formed offshore bars that coalesced and transgressed landward. Eventually these shoals attached and formed a peninsula emanating from the Rio Grande deltaic headland. As sea-level rose, the area landward of the mainland beach ridge became submerged, subsequently forming Laguna Madre. Morphological and sedimentological evidence suggest that the Gulf shoreline was at one time (modern Holocene ~ 11,000 years ago to present) approximately 15 to 25 miles seaward of its current position (Price 1954; Morton and Winkler 1979). Historically, sediment on South Padre Island was largely supplied from the Rio Grande River Delta, but reductions in flow and reservoir damming since the turn of the century, have led to a substantial loss of sediment to Brazos and South Padre Islands (Morton and Pieper 1975; Mathewson and Minter 1976).

The modern barrier islands consist of a thin sand wedge, approximately 9 to 15 feet (ft) thick (not including dunes), and its deposits extend to a depth of 9 ft below sea level (Morton 1994). Island sediment is composed of well-sorted, mostly fine-grained quartz sand. Grain sizes range from fine

to very fine sand (Kraus et al. 1996), with a slight tendency for increased grain size from south to north. Mean grain size is approximately 0.2 millimeters (mm). The coast is characterized as microtidal, with a mean tidal range of 1.5 ft, and relative sea-level rise is 3.66 mm/yr (0.012 ft/yr) (Gibeaut and Tremblay 2003).

Strong southeasterly winds and waves in the summer result in a predominately-northerly littoral drift direction. With the exception of extreme storms, the events with largest transport potential occur through fall and winter in response to frontal storms that tend to be accompanied by a storm surge (Houser and Mathew 2011). Storm surge associated with these events floods the broad sand flats along the northernmost part of the coast, causing considerable alongshore variations in dune height and width resulting in a beach that is prone to overwash. For example, at least 60 overwash channels were opened during successive hurricanes in 1933, and an equal number were reported following hurricanes Beulah and Allen (USACE 1981).

2.1. Dominant Coastal Processes

Understanding long-term evolution of coastal systems requires a regional assessment of dominant coastal processes, including winds, waves, and wave-generated currents, all of which affect local sediment transport magnitude and direction. Episodic events, such as hurricanes and storms, result in greatest changes in water levels, winds, and waves, causing large-scale changes along barrier island beach and dune systems. Even though storms are short in duration, they tend to be the dominant physical process producing sediment transport along the vast majority of coasts (Mathewson 2001).

2.1.1. Wind

Sand movement by wind is dependent on wind speed, direction, duration, and sediment particle size. Research on the effect of wind speed on sediment transport indicates that sand grains begin to move when wind speed reaches a certain threshold (Bagnold 1954; Belly 1964). This threshold speed varies with the sediment grain size because larger amounts of energy are required to move larger sediment particles. Bagnold (1954) indicated that the basic threshold value for the initiation of sand movement by wind is approximately 14 feet per second (fps), or about 10 miles per hour (mph). Predominant southeast winds for the Cameron County coast have an average speed of 5.3 meters per second (mps) or about 12 mph (Del Angel 2012). The southeastern quadrant of the wind rose depicts speeds of 10 to 20 mph occurring approximately 50 percent of the time (Figure 8). In spring and summer months, wind direction is almost exclusively from the southeast, and in winter months, winds become bimodal with a large frequency of wind approaching from the north-northwest. Relatively mild southeasterly winds are dominant in frequency, while intense northerly winds are dominant in velocity (Mathewson 2001).

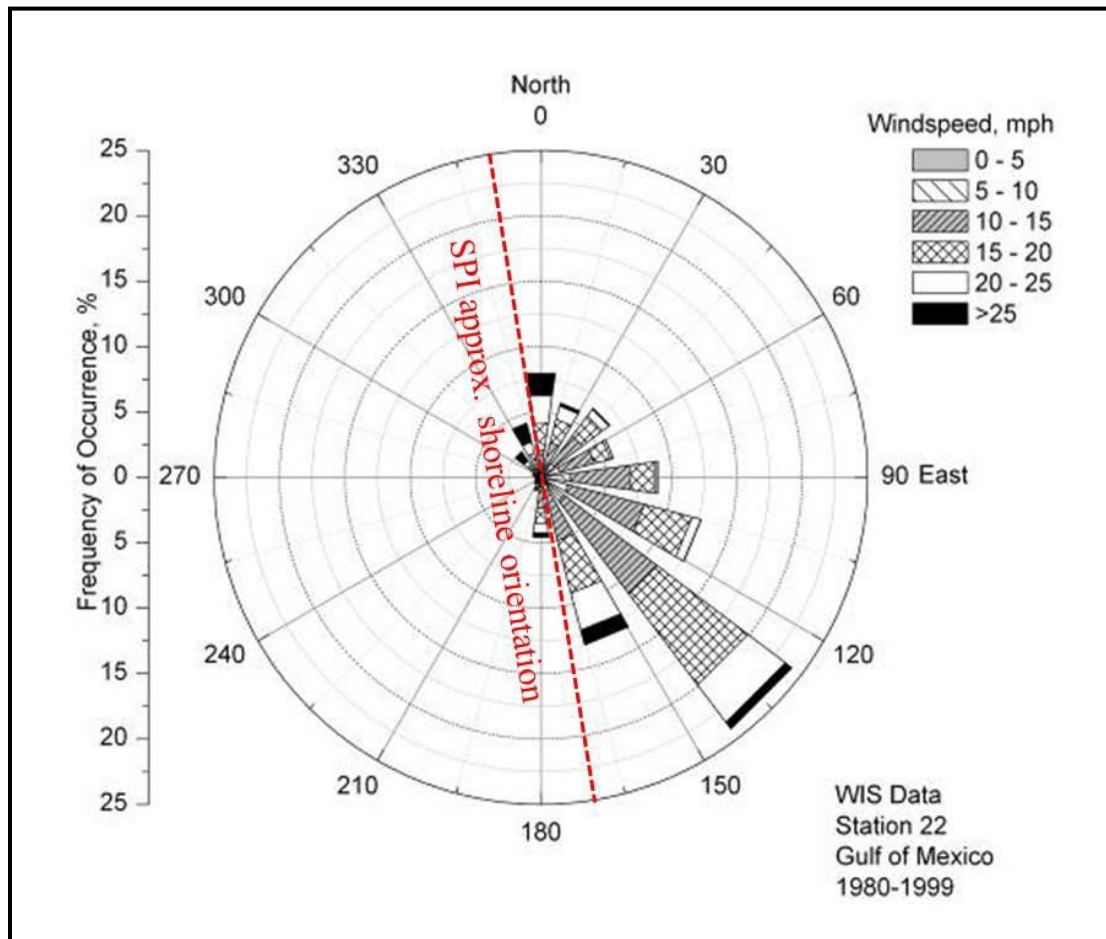


Figure 6 Wind Rose from USACE Hindcast Station #22 (HDR 2010).

Sand movement occurs as wind transfers momentum to sand particles, resulting in suspension, saltation, or creep (Figure 7). Saltation is the predominant form of transport, accounting for 75 to 80 percent of the total weight of sand moving past a fixed point per second (Bagnold 1941).

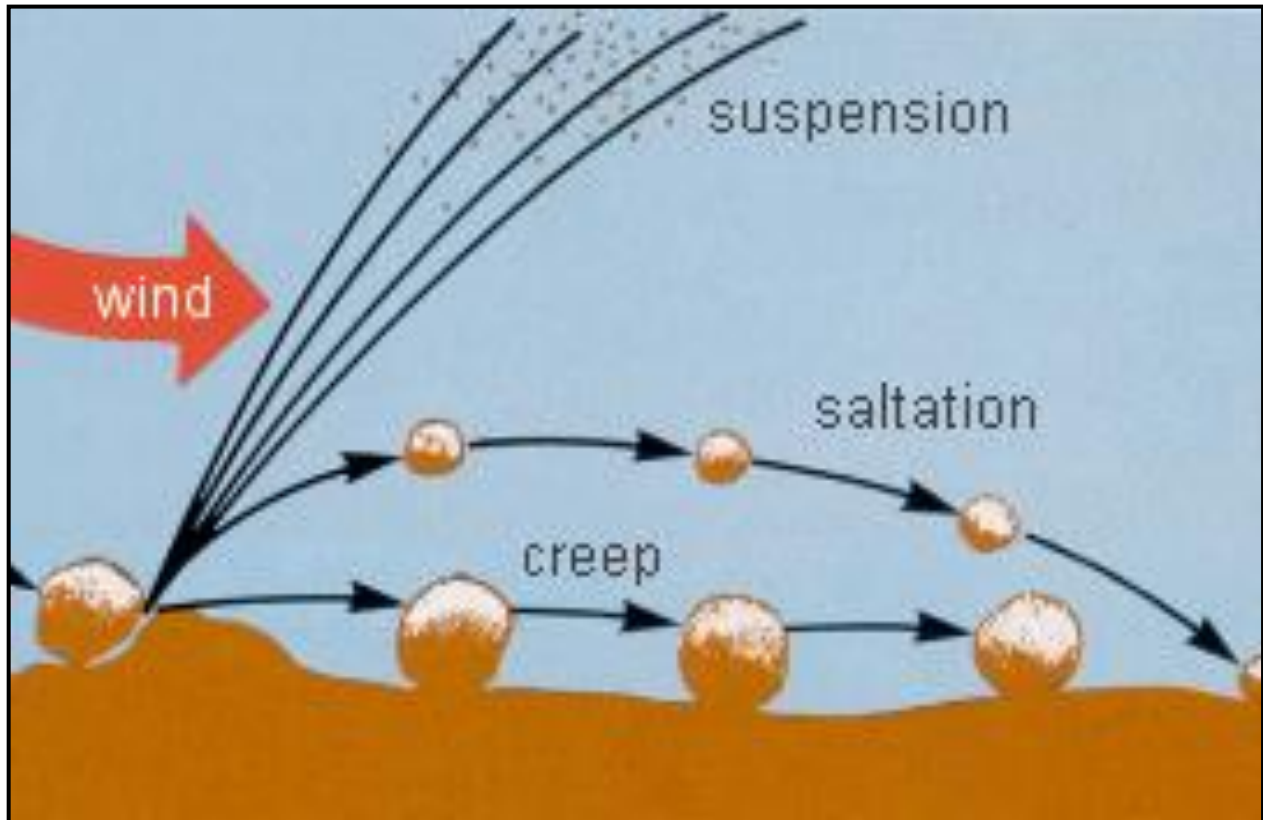


Figure 7 Examples of wind effects on movement

Another important factor affecting wind transport is the sand moisture content. Moisture on the beach is caused by elevated tide levels, precipitation, and low evaporation. Moisture makes sediment more cohesive and may increase the threshold wind velocity necessary to initiate saltation.

2.1.2. Waves

Prevailing southeast and less frequent north/northwest wind directions initiate sediment movement (littoral drift) by a current produced by waves breaking at an angle to the shoreline and moving adjacent to the shoreline within the surf zone (Figure 8). Changes in wave crest angles are responsible for the bi-directional movement of alongshore sediment (Figure 9).



Figure 8 Waves approaching from southeast induces a littoral current that results in

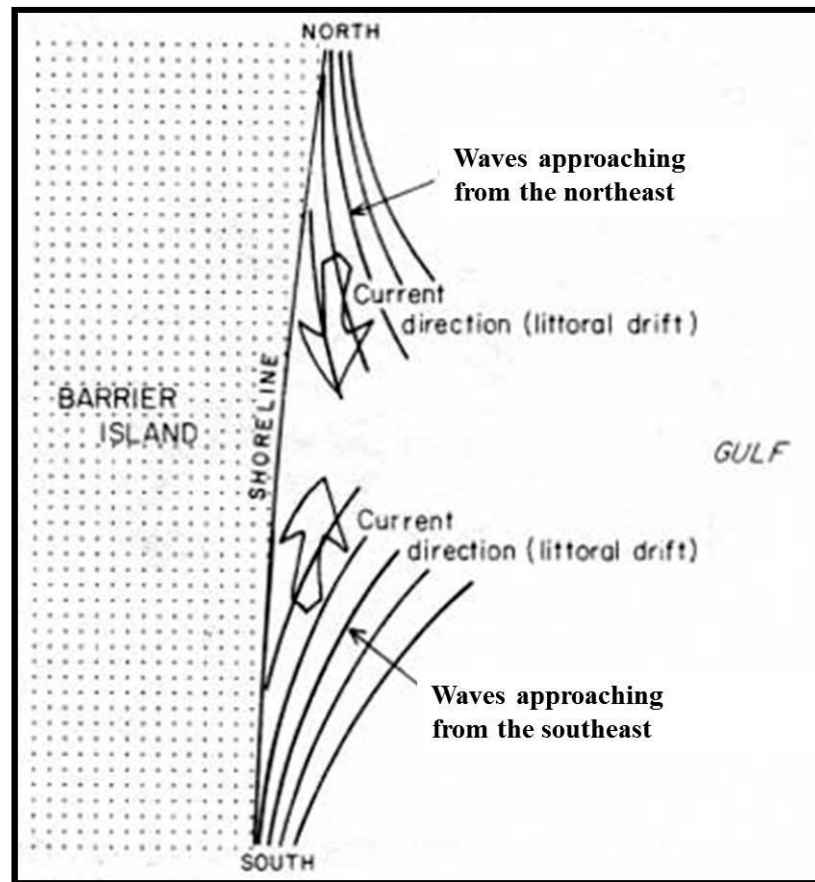


Figure 9 Waves approaching from the southeast and northeast, which in turn move sediment in those directions along the beach (Weise and White 1980).

The predominate wave approach angle for the Cameron County outer coast is from the southeast (Figure 9). Significant wave height is approximately 5 feet, and mean-peak wave period is 6.8 seconds (sec). Average monthly wave height is greater in the winter months (December and January) at 5.6 feet and lowest in July, August, and September at 3.9, 4.3, and 3.9 feet, respectively (Kraus et al. 1996). Estimates of net longshore sediment transport rates at SPI range from 100,000 to 150,000 cubic yards per year (cy/yr) northward (Heilman and Kraus 1996). South of SPI at the Rio Grande River mouth, net sediment transport rates have been estimated from numerical modeling to be approximately 75,000 cy/yr northward (Tschirky and Shelden 2003).

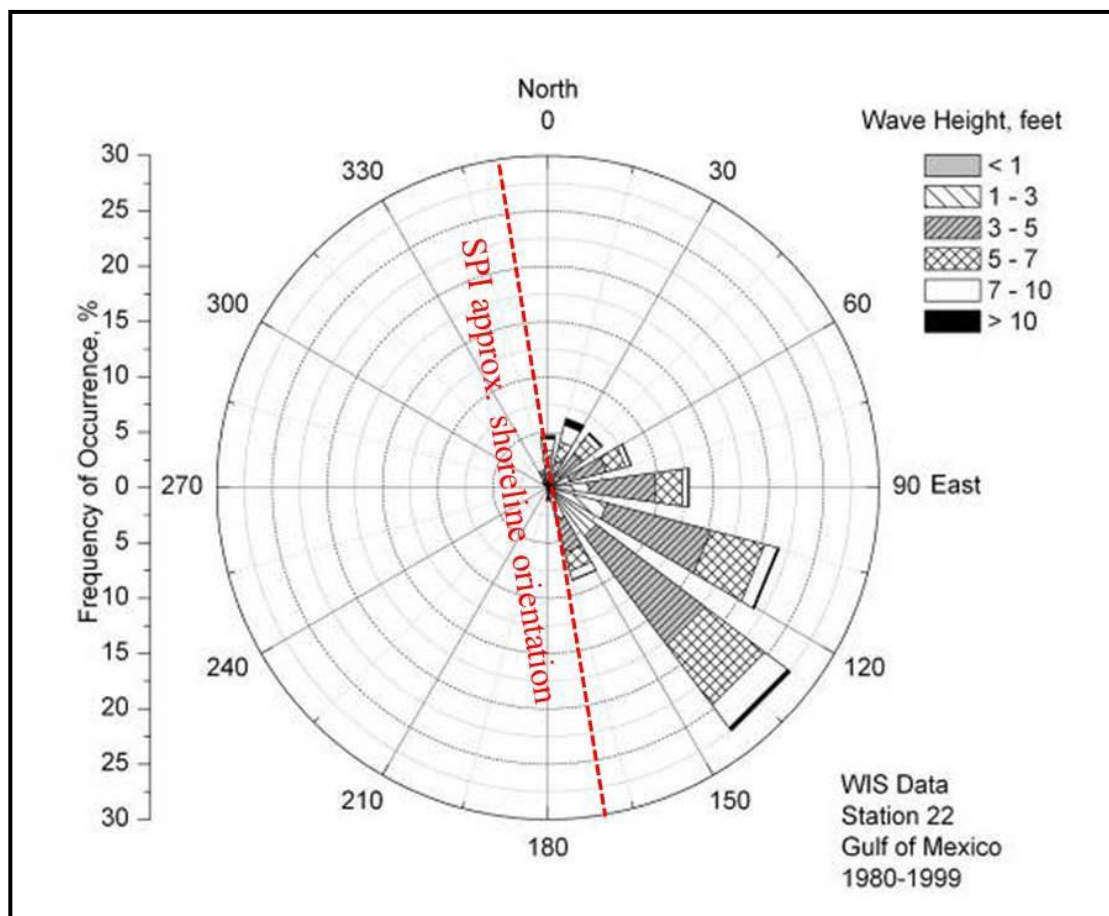


Figure 10 USACE WIS Wave Rose depicting predominate southeasterly wave direction (HDR 2010).

2.1.3. Storms

Barrier islands are typically the first land feature in the path of storm surge. Where a well-developed foredune exists, the barrier helps to block surge and dissipate large amounts of wave and current energy (Weise and White 1980). Although wave action is the dominant coastal process in the area, catastrophic storms (primarily hurricanes) play an important role in nearshore sedimentation. Normal, day-to-day physical processes along the Cameron County coast are relatively low energy. The areas low-tidal amplitude (1.5 feet) and broad, low gradient continental

shelf serves to dissipate much incident wave energy. In this environment, storm related processes are usually dominant. The Cameron County coast is affected by two types of storms: extratropical cold fronts ("northers") and tropical cyclones (tropical storms and hurricanes; Figure 11). Tropical storms (max sustained winds over 39 mph) have a recurrence interval of 8.3 year, and hurricanes (max sustained winds of over 74 mph) have a shorter recurrence interval of 6.2 year.

The historical tropical cyclone season extends from June 1st through November 30th. Most hurricanes impacting the Texas coast originate in the Caribbean Sea or Gulf of Mexico (Weise and White 1980). In the northern hemisphere, hurricane counterclockwise rotation develops a larger storm surge on its right side as it approaches the coastline.

Storm surge and wave heights are affected by the configuration and bathymetry of the ocean bottom. Storm surge along the lower Texas coast is normally much lower than along the upper Texas coast due to a wider continental shelf along the northern coast (Figure 12). Storm surge from Hurricane Allen was 8 to 12 feet for the southern coast instead of 15 to 20 feet that would have occurred to the north. Elevation differences exist because in deeper water, surge can be dispersed down and away from the shoreline. However, upon entering a shallow, gently sloping shelf, storm surge cannot be dispersed, but is driven ashore by hurricane wind stresses (Figure 13).

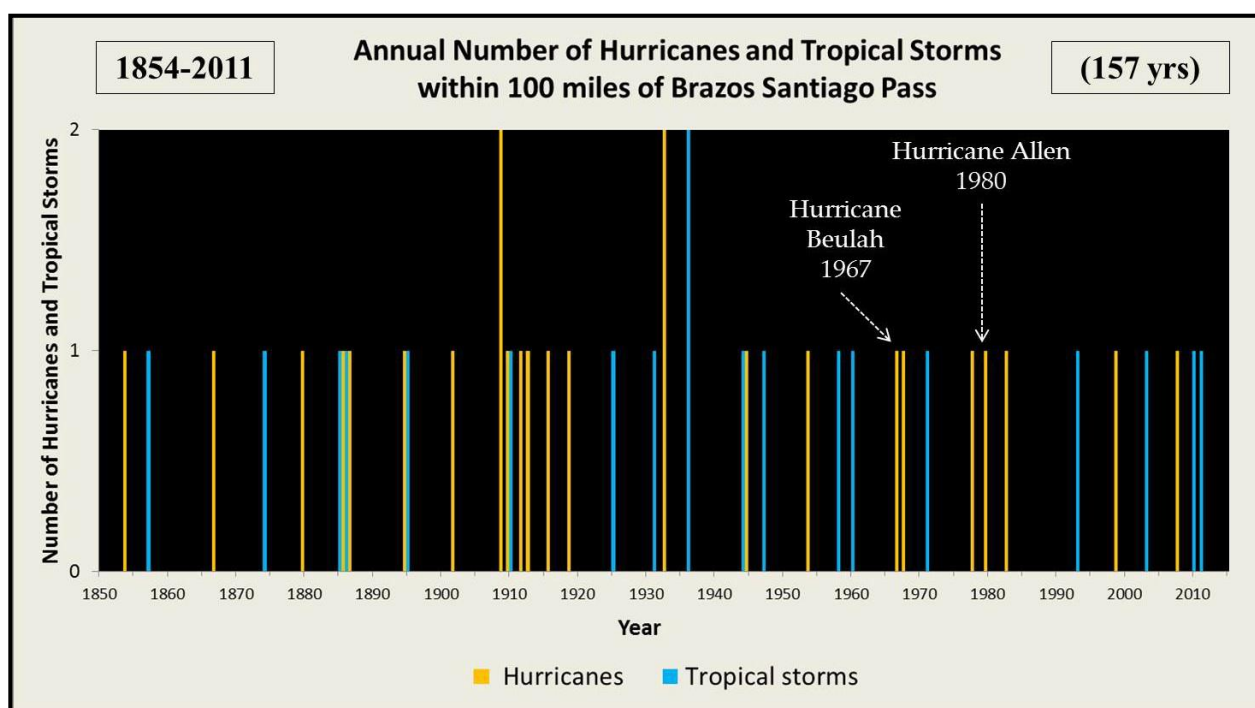


Figure 11 Tropical Storms and Hurricanes (44) with 25 hurricanes and 19 Tropical Storms.
(<https://coast.noaa.gov/hurricanes/>)

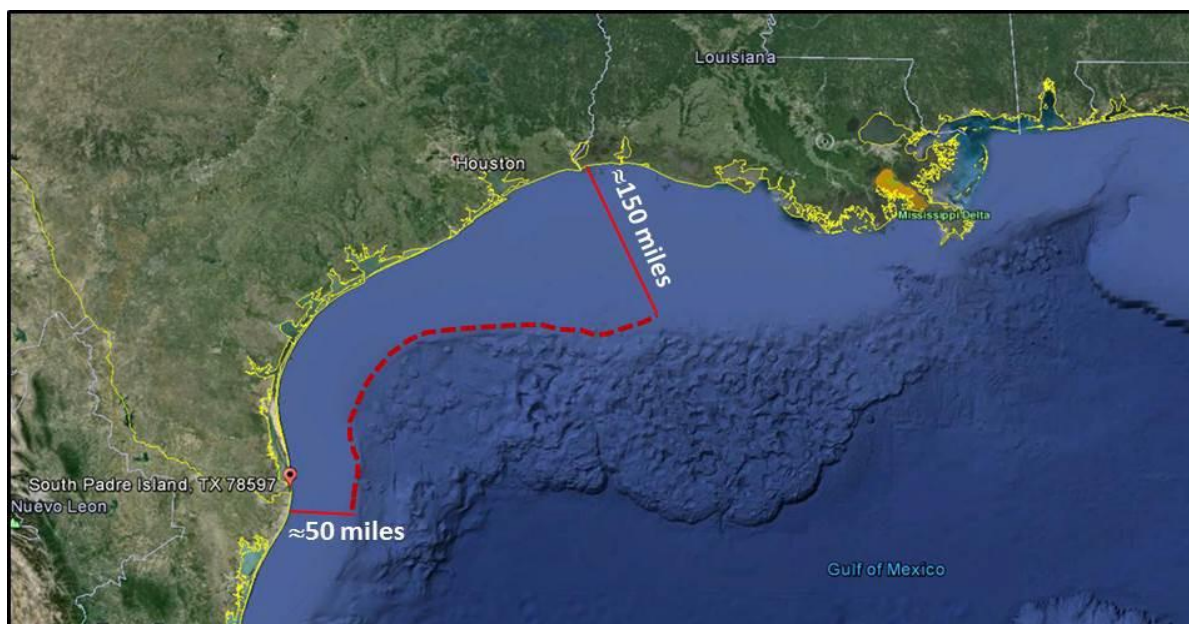


Figure 12 Visual approximations showing the differences in width of the Continental shelf-northern vs southern Texas coast.
http://en.wikipedia.org/wiki/Storm_surge

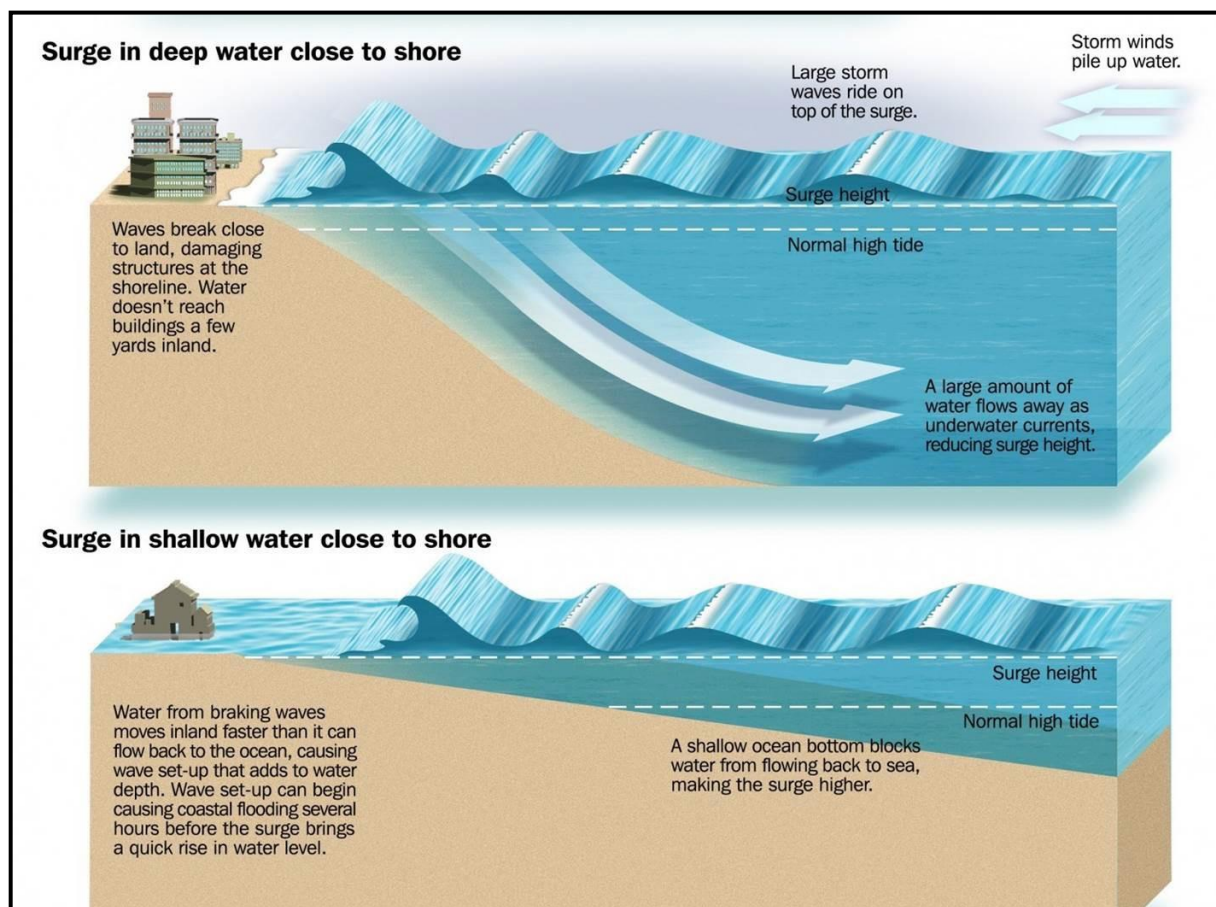


Figure 13 Illustration of how coastal depth impacts storm surge (Williams and AMS Weather Book, American Meteorological Society, 2009).

An examination of hurricane pathways in the Gulf shows that most enter and/or track from the southeast, and curve north and northeast through eastern and central portions of Texas or strike the lower coastline on a more westward track. Ten major storms since 1960 that followed a westward track were Carla (1961), Beulah (1967), Celia (1970), Caroline (1975), Amelia (1978), Allen (1980), Arlene (1993), Bret (1999), Emily (2005), and Dolly (2008) (Table 1 and Figure 16). Hurricanes Allen and Beulah had the highest storm surge recorded for this area reaching approximately 8 feet and 20 feet respectively (Roth 2000), with peak wave heights of over 24 feet (Kraus et al. 1996). These two storms resulted in over 70 overwash channels. Tide gauge data indicate a time lag of some 14 hours on the rising storm tide between the Gulf of Mexico and south Laguna Madre. This time lag set up a cross-barrier water level differential of up to 5 feet (Suter et al. 1982).

Table 1. Major storms since 1960 (from Del Angel, 2012)

Date	Storm Name	Category at Landfall
------	------------	----------------------

September 1961	Carla	Hurricane - 4
September 1967	*Beulah	Hurricane - 5
August 1970	Celia	Hurricane - 3
August 1975	Caroline	Hurricane - 3
July 1978	Amelia	Tropical Storm
August 1980	*Allen	Hurricane - 3
June 1993	Arlene	Tropical Storm
August 1999	*Bret	Hurricane - 4
July 2005	Emily	Hurricane - 3
July 2008	*Dolly	Hurricane - 1
*directly impacted Padre Island		



Figure 14 Tracks of major storms since 1960. Data obtained from NOAA National Hurricane Center (<http://www.nhc.noaa.gov/>).

Northers are extratropical mid- to high-latitude winter storms driven by masses of cold Arctic air that generally travel from west to east. These storm fronts can occur about every week to ten days from November through April (Morton 2003). Northers cause rapid changes in water levels and associated wave erosion. Preceding passage of a cold front, strong onshore winds elevate nearshore waves and coastal water levels, flooding beaches and exposing the coast to strong wave attack. As the front passes the coast, strong winds are directed offshore driving water back across the backbarrier flats towards the ocean. Frequent oscillation in water levels and waves results in shoreline change on both sides of the barrier island. In general, these winter storms cause much less land loss and/or property damage than do hurricanes.

The Cameron County shoreline exemplifies a typical wave-dominated, microtidal coast that experiences dramatic morphological changes resulting from tropical storms. Low-frequency, high-energy events intensify physical processes surpassing normal sediment transport thresholds, thus accelerating coastal change. During major storms, the surf zone widens, wave heights increase, longshore currents accelerate, and sediment transport significantly increases along the shoreface (Morton 1981; Snedden et al. 1988).

Douglas 1985, through numerical modeling attempted to quantify the influence of storms (both tropical and extratropical) on longshore sediment transport in the vicinity of Ocean City, Maryland. His results showed that approximately 50 percent of total longshore sediment transport occurs for 5 percent of the record, and 90 percent of the transport occurs during 35 percent of the days (Figure 15). These data results are relative to the ERP study area, and emphasize how a few storm events account for large-scale magnitudes of sediment movement and redistribution in a relatively short period of time.

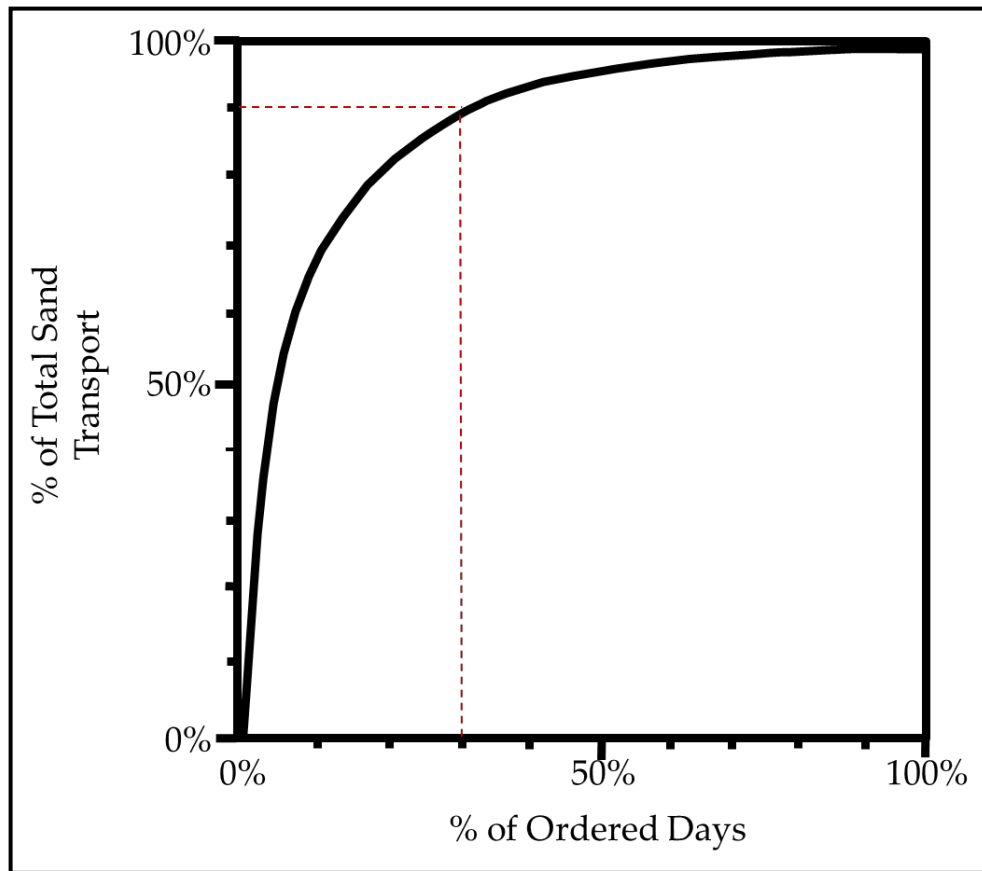


Figure 15 The influence of storms (both tropical and extratropical) on longshore sediment transport, from hindcast data (Douglas 1985)

2.2. Coastal Dunes

Coastal dunes are elevated features along the backshore portion of a beach and are part of the sand sharing system that actively exchanges sand between the dune, the beach, and offshore bars (Figure 18). Understanding natural processes that influence creation of coastal dunes, the interaction of dunes with the beach, and their relationship with the coastal sediment budget, guide recommendations for dune management strategies.

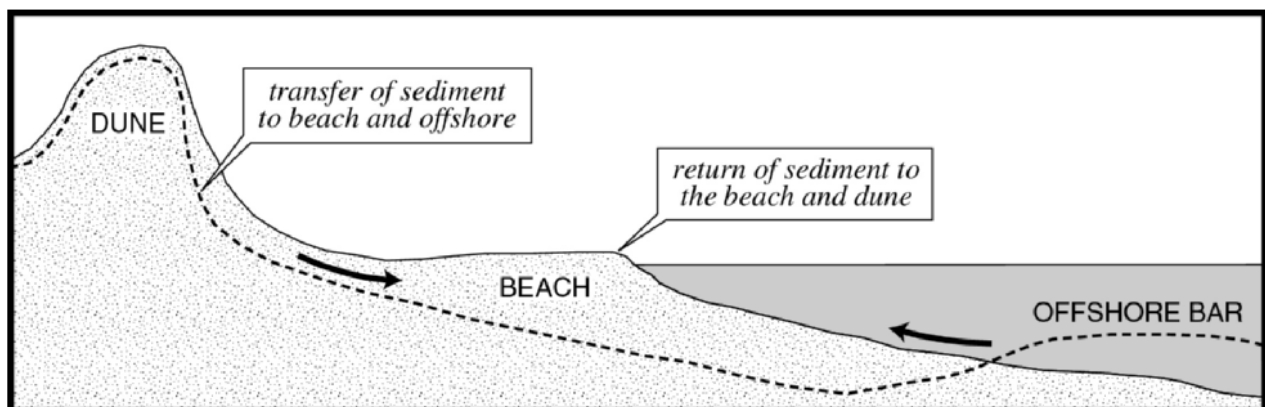


Figure 16 Exchange of sand within the sand-sharing system (Psuty 2008).

2.2.1. Dune Morphology

Coastal dunes are windblown features inland of a beach and are sites of sand accumulation and storage. Dune formation and migration depends on the transfer of sand between beach and dune systems. Dunes exist because more sand deposits at their locations by wind and wave processes than is removed (Psuty 2008).

Under storm conditions (onshore winds), short, steep, erosional waves move sand from the beach and the dune to an offshore bar (Figure 17). Beach erosion and deposition of sand offshore creates a wide shallow platform, that helps dissipate increased wave energy. This often results in a loss of dune sediment. Under such conditions, raised water levels and increased wave heights may cause a breach and/or overwash of the dune. Sediment is deposited in the form of washover fans, which are considered temporary storage areas from which sediment is eventually redistributed by wind to the dunes (Figure 18) (Fisher and Stauble 1978).

After storm passage, more gentle waves gradually return eroded sand from offshore back to the beach. Dune recovery depends on beach recovery through the onshore migration of sand (Figure 19), followed by accretion on the backshore by wind transport to create a new dune or add to an existing dune system (Figure 20) (Morton 1994; Aagaard et al. 2004).

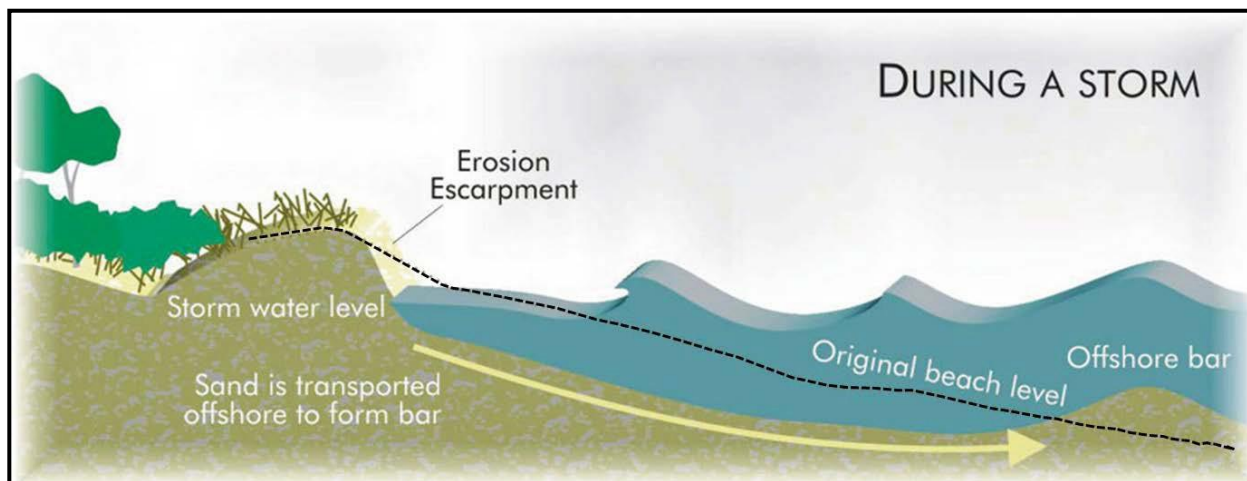


Figure 17 Storm profile (<http://www.dunetrust.org.nz/dune-restoration/how-dunes-work/>).

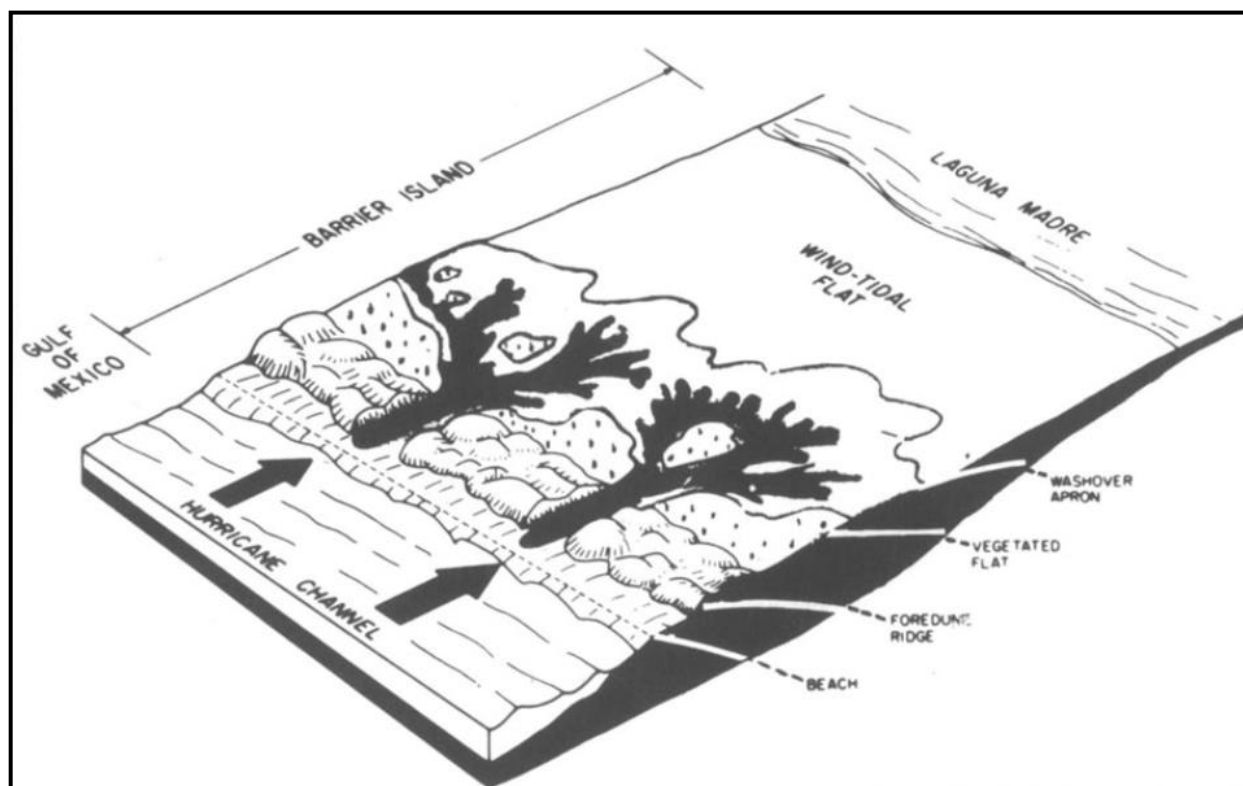


Figure 18 Diagram showing plan view of a washover fan. (McGowan and Scott 1975).

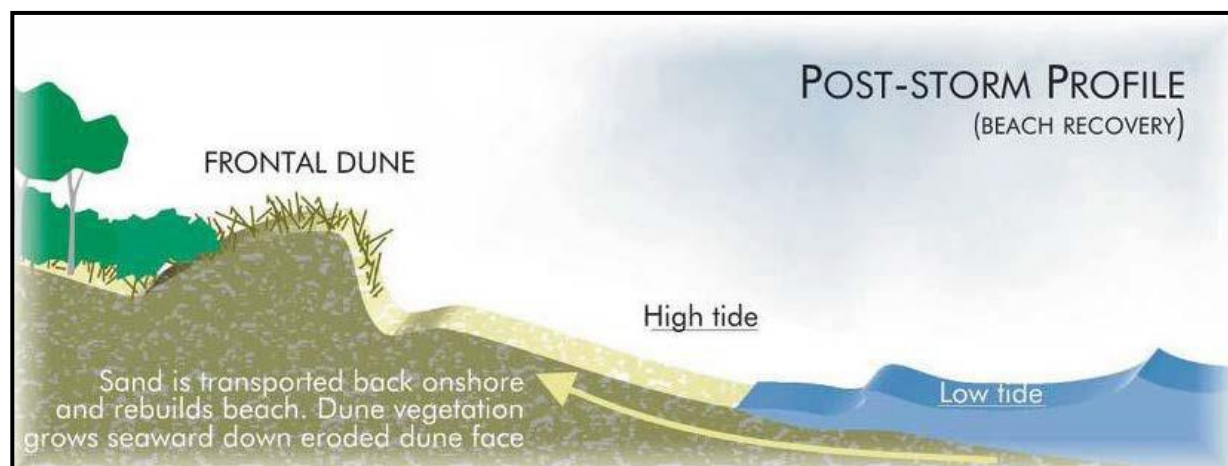


Figure 19 Post storm profile-Beach Recovery (<http://www.dunetrust.org.nz/dune-restoration/how-dunes-work/>).

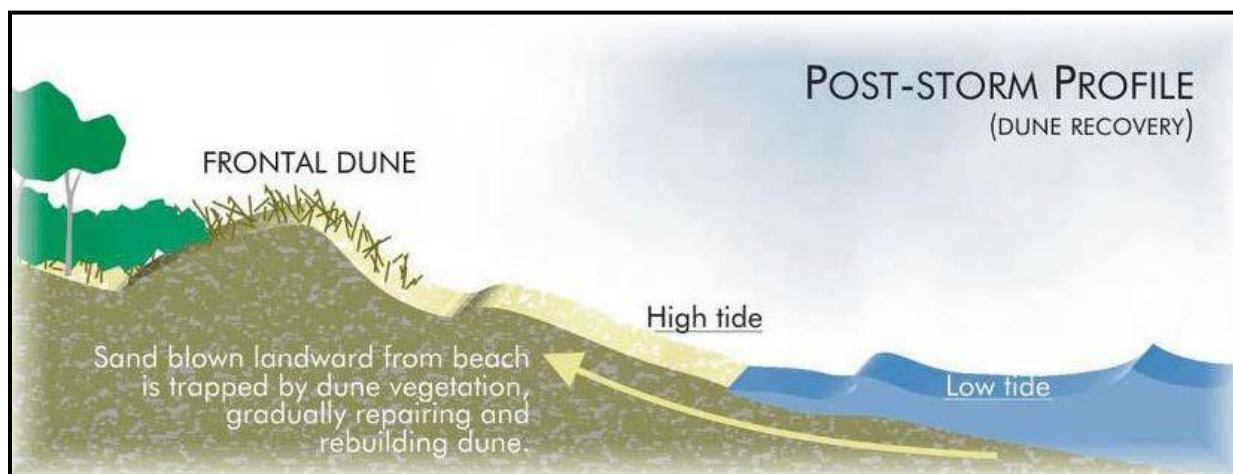


Figure 20 Post storm profile –Dune Recovery (<http://www.dunetrust.org.nz/dune-restoration/how-dunes-work/>).

Dune morphology on a storm-dominated, eroding barrier island (e.g., Cameron County) is highly influenced by the frequency and recovery from storm events. A conceptual model developed by Ritchie and Penland (1988) for Louisiana barrier islands relates storm return period to a beach-dune sediment budget (Figure 21). After a storm event, the beach and dune recover volumetrically and morphologically with the aid of re-established vegetation. Beach and dune recovery continues until the occurrence of the next storm event (Del Angel 2012). The hurricane return period for SPI is approximately 6 years.

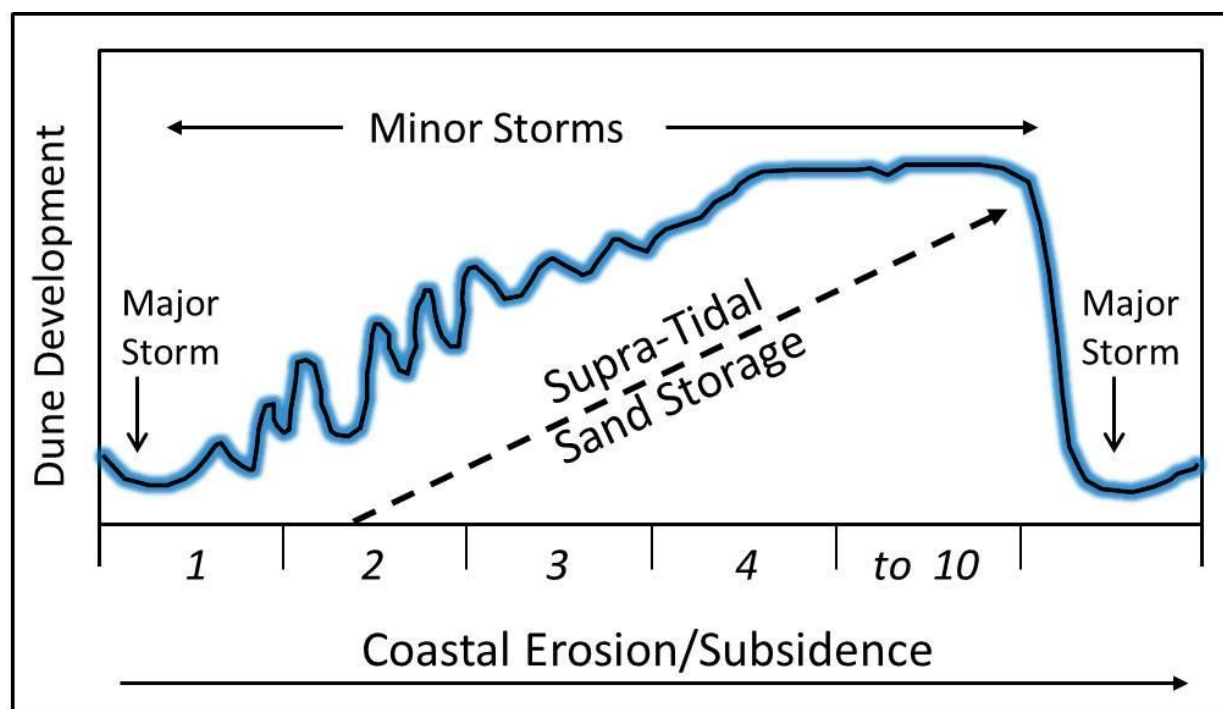


Figure 21 Ritchie and Penland (1988) generalized conceptual model of sand dune development for the southern Louisiana coast. Major storms correlate to hurricanes and minor storms correlate to cold fronts.

2.2.2. Dune Topography

The regions semi-arid climate plays an important role in dune topography along the coast (Figure 5). Prolonged droughts affect the growth/development and viability of vegetation that help hold sand in place within the beach-dune system. Vegetation type and percent cover directly affects dune morphology by influencing the location and pattern of sand deposition. The percentage of vegetation varies with seasonal precipitation, ranging from 30-75 percent (Del Angel 2012). Two primary types of dunes exist within Cameron County. The first type are stable foredune clusters up to 25 feet high, moderately well-vegetated but discontinuous because overwash channels create wide breaks in the dunes. These hummocky dunes occur in oval shaped clusters that form the highest barrier elevations (Morton 1993) (Figure 22). These stable clusters of dunes also constrict storm floodwaters that flow through adjacent overwash channels. The second dune type contains



Figure 22 Oval-shaped characteristics of dune fields separated by overwash channels north (Left image) and south (right image) of Brazos Santiago Pass

low (3 to 15 feet high) crescent-shaped features that are sparsely vegetated to unvegetated and migrate to the north-northwest by predominate southeasterly winds. These small coppice dunes of unstable sand near the shoreline are relatively undeveloped, having accumulated since the last major storm (Morton 1993).



Photo 3 Example of coppice dunes of various sizes, By P. Ravella, February 2016.

2.3. Historical Shoreline Change

Six outer coast shoreline datasets were used for documenting historical shoreline change for the Cameron County coast between the Rio Grande (south) and Mansfield Pass (north) for the period 1854/67/80 to 2014 (Table 2). Shoreline change was quantified for four time periods specific to natural processes and engineering activities influencing the magnitude and direction of change. The shoreline change methodology is described in Appendix B.

Table 2. Shoreline source data characteristics.		
Date	Data Source	Comments and Map Numbers
1854/67/80	USC&GS Topographic Maps; 1:20,000	First regional shoreline survey throughout study area using standard planetable surveying techniques; 1854 - Rio Grande to Brazos Santiago (T-453); 1867 - Brazos Santiago entrance northward (T-1045), 1880 - Padre Island (T-1476a, T-1476b, T-1477a, T-1477b).
June 1939	USC&GS Topographic Maps; 1:10,000 (T-6707), 1:20,000 (all others)	Second regional shoreline survey throughout study area using standard planetable surveying techniques; June 1939 - Rio Grande to Boca Chica (T-6704b), Brazos Santiago (T-6707), Padre Island (T-6706a, T-6705b, T-6705a, T-6704b).
February 1995	Aerial Photography; 1 meter resolution	Digital Ortho Quarter Quads (DOQQs) interpreted by Applied Coastal; February 1995 - Rio Grande to Padre Island.
May 2014	NAIP Aerial Photography; 1 meter resolution	National Agriculture Imagery Program (NAIP) digital ortho imagery interpreted by Applied Coastal; 4 May 2014 - Rio Grande, Brazos Santiago and South Padre Island, 15 May 2014 - Padre Island north of Long Point.

Each time period reflects changes in engineering activities that potentially influenced the direction and magnitude of shoreline change along the Cameron County coast. Initial shoreline surveys were conducted in 1854/67/80 followed by another regional survey in 1939 (Table 2). Although the USACE attempted to stabilize Brazos Santiago Pass and provide a navigable channel during the periods 1882 to 1884 and 1926 to 1928, the original stone dikes on either side of the entrance failed and the dredged channel was abandoned due to excessive shoaling (Sargent and Bottin 1989). Jetties on either side of the entrance channel were constructed between 1933 and 1935 and extended offshore to the 25-ft depth contour. As such, the initial shoreline change analysis period primarily reflected natural beach changes prior to significant engineering activities.

Between 1939 and 1995, sand transport on Brazos Island and SPI was directly influenced by jetty placement at Brazos Santiago Pass. Channel maintenance occurred regularly during this time, but all sand dredged from the channel was placed in offshore locations (HDR 2010). It was not until 1997 that sand dredged from the channel was placed directly on the beach. As such, the 1995 to 2014 shoreline change analysis period records beach response directly influenced by sand placement along SPI. The final analysis period (1939 to 2014) documents shoreline position changes that occurred post-jetty construction, including channel navigation activities and

beneficial use of sand dredged from the pass and placed on or seaward of Cameron County beaches.

Prior to major engineering activities influencing shoreline change along the Gulf coast of Cameron County (1800s to 1939), beaches north of Brazos Santiago Pass were strongly erosional and Brazos Island beaches were net accretional (Figure 23). In fact, greatest rates of shoreline recession were recorded just north of Brazos Santiago Pass where beach changes approximately 2 miles north of the pass peaked at about -18 ft/yr tapering off to between -7 and -10 ft/yr 8 Brazos Santiago Pass miles north of the pass to the county line. Net accretion south of the pass increased steadily toward the Rio Grande River mouth where sediment supplied to the coast was reworked and transport northward. Peak deposition north of the river mouth was greater than 15 ft/yr transitioning to slight erosion just south of the pass.

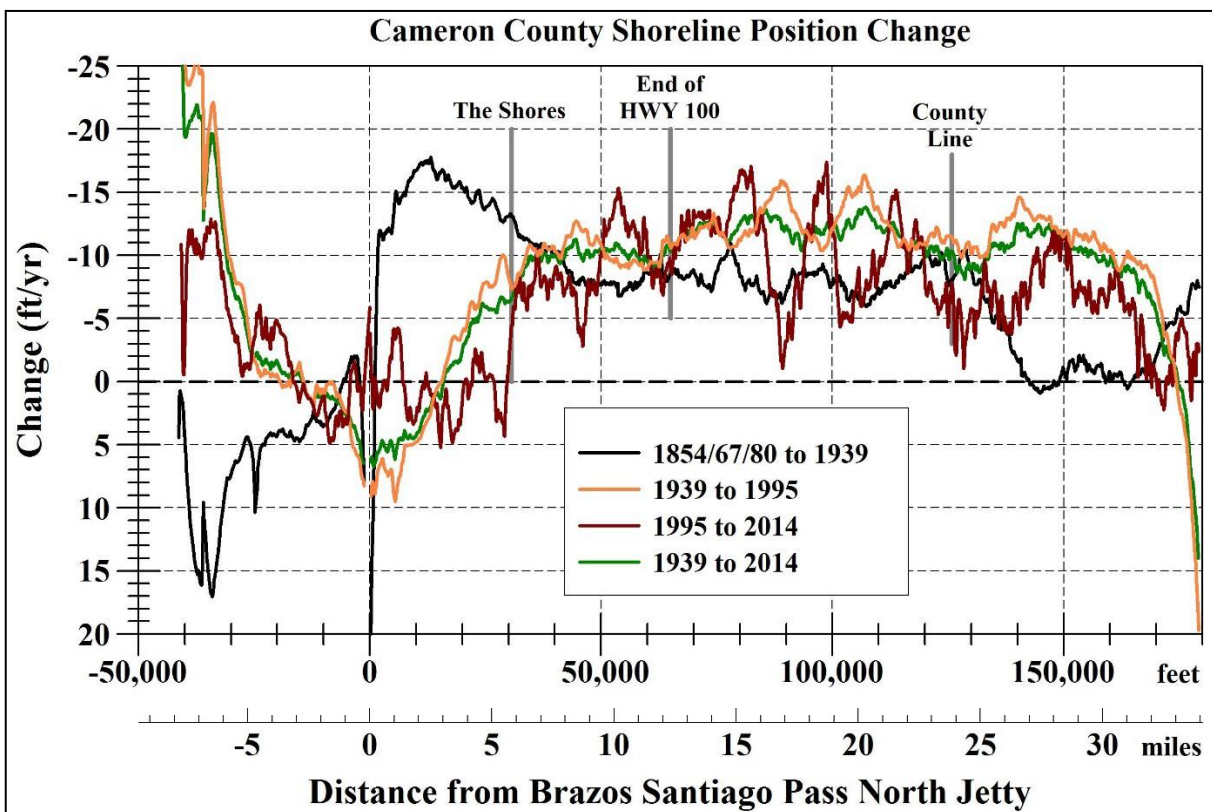


Figure 23 Historical shoreline change for Cameron County, TX between 1854/67/80 and 2014. Besides the location of the BRAZOS SANTIAGO PASS north jetty (0 on the graph), three reference locations denote the northern limit of the developed portion of SPI (The Shores)

The large amount of shoreline recession just north of the entrance is not a response to jetty placement; shoreline change in this area between 1867 and 1917 illustrates substantial recession prior to jetty placement (Figure 24), and changes between 1917 and 1939 exhibit slight accretion. Further, shoreline change in this area between 1939 and 1995 (after jetty construction) documents net accretion to about three miles north of the north jetty with erosion increasing to about 10 ft/yr

and greater at about 8 Brazos Santiago Pass miles north of the jetty to the County Line. Shoreline erosion south of the jetty mirrored accretion trends prior to 1939, indicating that damming within the Rio Grande drainage basin after 1939 had considerable influence on sediment and water availability at the coast (Paine and Morton 1989). Drought conditions in the Rio Grande, reservoir development, and water diversions for irrigation limited river flows, beginning a sharp decline in total discharge and sand supply to Gulf beaches.

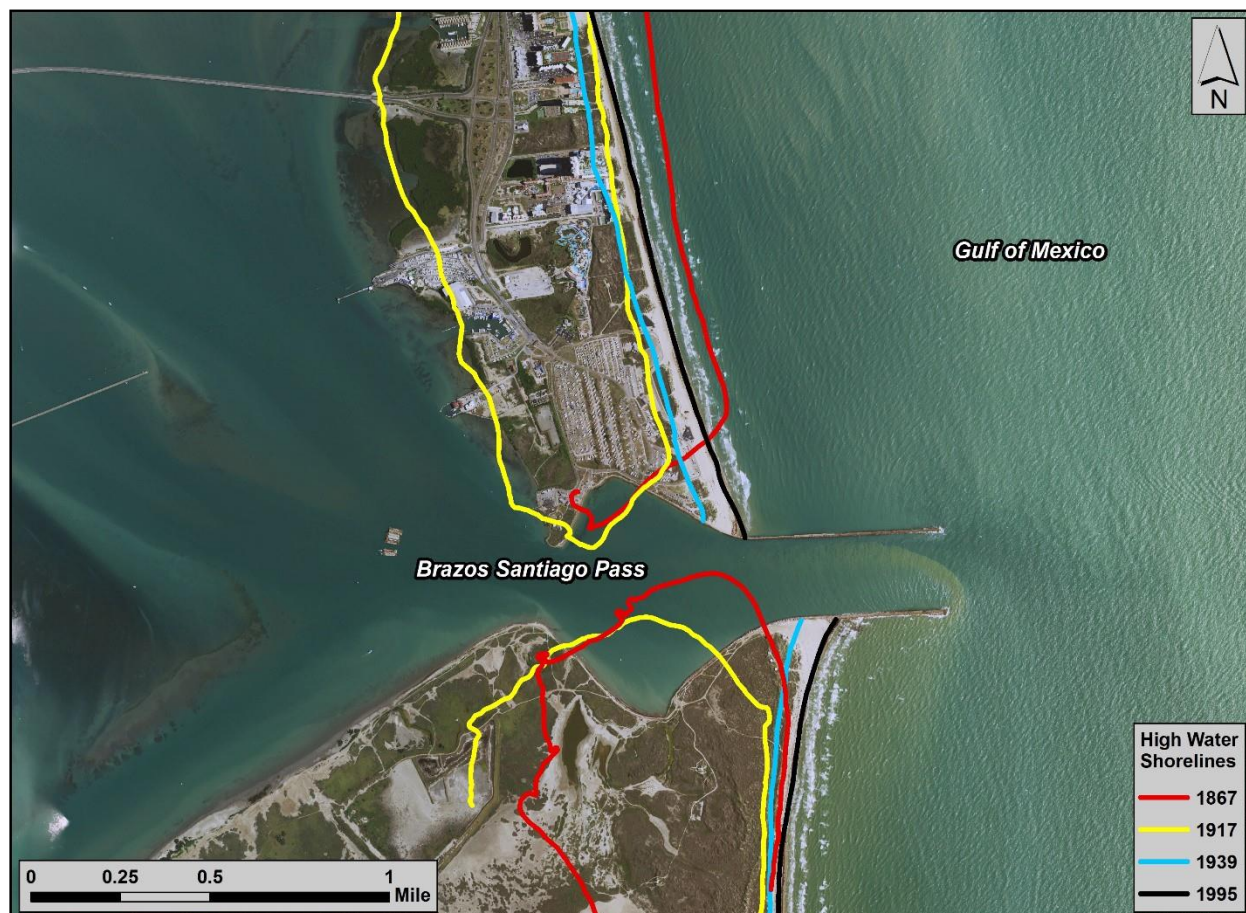


Figure 24 Historical shoreline change for at Brazos Santiago Pass between 1854/67/80 and 1995 illustrating net accretion on both sides of the pass since 1917.

Beginning in 1997, a portion of the sand dredged from Brazos Santiago Pass was placed on the developed beach north of the pass. This had substantial impact on shoreline recession rates along the beaches fronting the incorporated portion of SPI (Figure 25). Although net erosion was recorded within 2 Brazos Santiago Pass miles of the north jetty (as compared with net accretion between 1939 and 1995), beaches north of this point to the northern limit of developed beach were relatively stable with alternating zones of minor erosion and accretion. North of The Shores development to the County Line, shoreline recession rates increased substantially to -7 to -17 ft/yr. Although the peaks in shoreline recession were slightly greater at specific locations between 1995

and 2014, average recession rates appear consistent with those recorded for the 1939 to 1995 period north of the developed shoreline.

Between 1939 and 2014, beach changes associated with jetty construction and placement of sand dredged from the Brazos Santiago Pass navigation channel in nearshore sites and on the beach were well illustrated adjacent to the channel and along the developed beaches of SPI. South of Brazos Santiago Pass, net deposition occurred within about 2 to 3 miles of the south jetty; however, from this point south to the Rio Grande River mouth, net shoreline recession was dominant and increased steadily toward the river mouth where peak shoreline recession rates exceeded 20 ft/yr. Beach deposition also was dominant north of Brazos Santiago Pass for about three miles during this same period, possibly due to onshore transport of sand from the pre-jetty ebb tidal shoal complex associated with the pass (Morton 1993). Net shoreline recession consistently increased to the north of this deposition zone for the length of the developed shore of SPI. North of the incorporated city of SPI, net shoreline recession remained at between 10 and 13 ft/yr to the county line. Although less variable, this trend in net shoreline recession is consistent with beach erosion trends recorded for all time periods after construction of the jetties at BSP.

2.3.1 Average Shoreline Change by Reach

Average shoreline change rates were determined for each of these reaches based on the post-jetty construction analysis periods presented in the Introduction. The purpose of this analysis was to quantify average shoreline change beach volumes for different time periods, and assist with the landward placement of a storm protection dune.



Figure 25 Modified coastal classification scheme from Morton and Peterson (2006). Much of the shoreline along the developed portion of SPI has retaining walls

The following three sections will examine shoreline change during three periods: 1939 to 1995, 1995 to 2014 when SPI began beach nourishment, and the overall time from 1939 to 2014.

2.3.1.1 - 1939 to 1995

This 56-year period encompasses numerous anthropogenic (man-made) activities that have affected beach sediment transport. Stabilization of the natural inlet with jetties in 1935, dredging of the ship channel and maintenance dredging between these jetties since 1935, reduced flow and coastal sand supply from the Rio Grande River (Paine and Morton 1989), and initiation of beneficial use of sand dredged from the Brazos Santiago Pass commenced in 1988 (HDR 2010).

Additionally, the width of the beach and dune system within the developed section of South Padre Island is limited owing to the retaining walls serving as the fixed back dune line (Caudle et al. 2014). A line of retaining walls that front most existing and developed properties were built after hurricane Beulah in 1967 (Morton 1988). Nearly all buildings along the developed coast were constructed at or seaward of the vegetation line and were equipped with low, reinforced concrete bulkheads or seawalls to protect their foundations (Figure 25) (Morton 1988). Although these protective structures potentially limit sand transport to the north under erosive storm conditions, the City of SPI has been active in maintaining a recreational beach and protective dune system seaward of the structures, providing ample sand for transport to the north.

For a distance of approximately ten miles south of Isla Blanca Park, Boca Chica Beach (Brazos Island) (Zone 1) recorded net deposition just south of the jetty and net shoreline recession south of this point to the Rio Grande (Figure 24). Shoreline advance adjacent to the south jetty reached about 4.95 ft/yr, and net shoreline recession adjacent to the Rio Grande peaked at about 25 ft/yr.

Overall, average shoreline change for Zone 1 during this period was net erosional at 5.55 ft/yr.

The Shores to Park Road 100 reach (Zone 2) illustrates a relatively consistent net erosion rate that averages approximately 10.2 ft/yr (Figure 29), a little more than a foot per year greater on average than recorded during the pre-jetty period (see Figure 26). The adjacent North Beaches reach (Zone 3) documents an average change rate of approximately -12.5 ft/yr, an increase of about 4 ft/yr erosion compared with natural changes recorded prior to 1939. Moreover, this is a 2 ft/yr higher erosion rate than the adjacent Zone 2 reach. In the middle of Zone 3, two areas of erosion are prominent with rates exceeding 15 ft/yr. This shoreline section has numerous storm-induced overwash channels and significant alongshore variability in dune crest elevations, both of which result in dune instability and greater susceptibility to storm-induced change (Houser 2013).

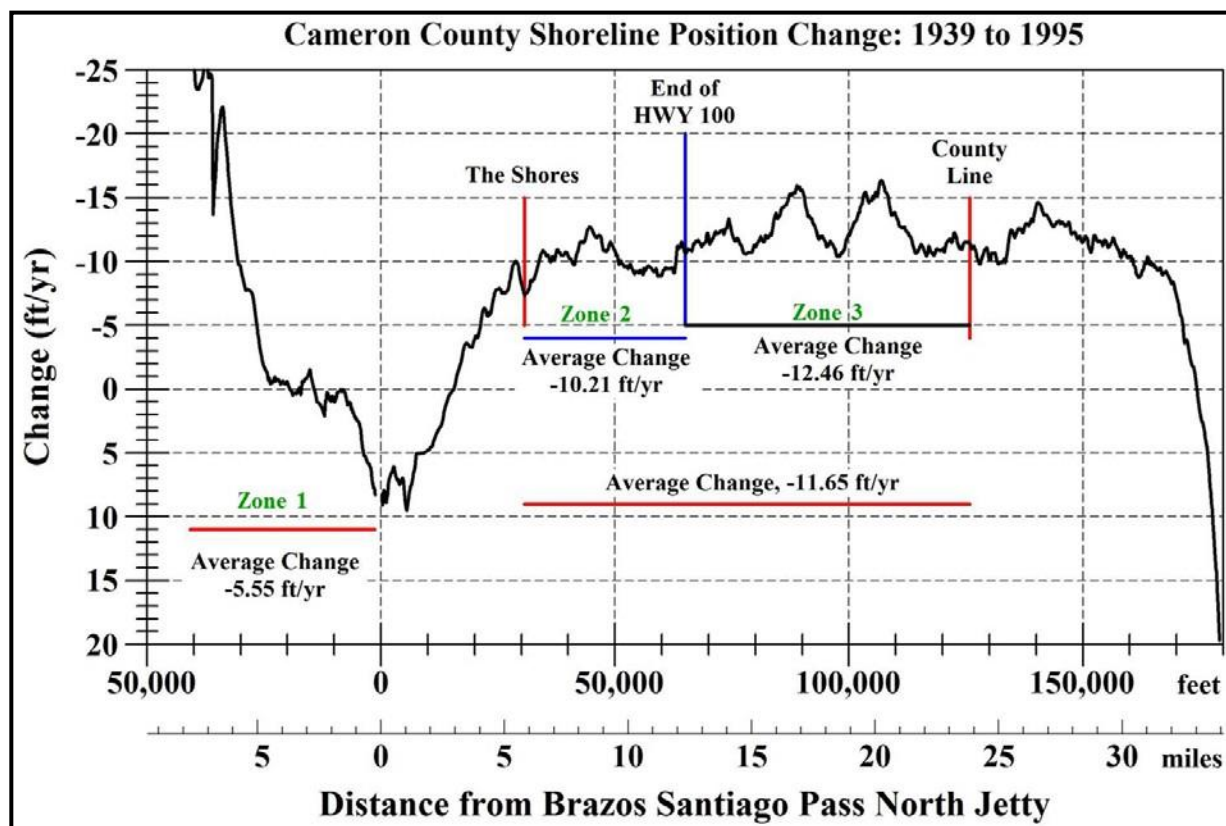


Figure 26 Average shoreline changes for Cameron County ERP reaches, 1939 to 1995. Besides **

2.3.1.2 - 1995 to 2014

During this 19-year period, a majority of sediment dredged from the Brazos Santiago Pass was placed on South Padre Island beaches or within a nearshore berm. Sand from the channel was placed in the nearshore berm in 1988 and placed directly on the beach beginning in 1997. From 1988 to 2014, 20 placement events (about 7.9 million cy) were completed (Table 3). Of these 20 events, 11 placed material in the nearshore berm (4.4 million cy) and 9 placed sand directly on the beach (3.5 million cy). Material placed in the nearshore berm since 1995 is approximately 3.6 million cy and includes sediment dredged from reaches of the channel containing a high percentage of silt and clay. Annual beach and nearshore surveys have not been able to document whether this material has migrated directly on to the beach (HDR 2015). However, the developed SPI shoreline has averaged stable to accretional over the last 19 years, a significant change in shoreline response for the northern half of the developed coast prior to sand placement on the beach (Figure 30).

Table 3. Dredged material placement history for South Padre Island (from HDR 2015).

Year	Type of Placement	Location ¹	Est. Dredged Volume ² (cy)
1988	Berm	Nearshore Berm	220,000
1991	Berm	Nearshore Berm	580,000
1995	Berm	Nearshore Berm	750,000
1997	Nourishment	Stations 182+29 to 242+29	490,000
	Berm	Nearshore Berm	396,000
1999	Nourishment	Stations 80+00 to 120+00	495,000
	Berm	Nearshore Berm	195,000
2000	Nourishment	Stations 206+00 to 238+00	370,000
2002	Nourishment	Stations 184+00 to 218+00	330,000
	Berm	Nearshore Berm	329,000
2003	Berm	Nearshore Berm	356,000
2005	Nourishment	Stations 9+30 to 30+00	49,000
		Stations 182+00 to 213+00	229,000
2006	Berm	Nearshore Berm	340,000
2007	Berm	Nearshore Berm	443,000
2008	Berm	Nearshore Berm	500,000
2009	Nourishment	Stations 208+40 to 255+00	407,000
2010	Nourishment	Stations 7+00 to 34+00	90,000
		Stations 235+00 to 265+00	130,000
2011	Nourishment	Stations 10+00 to 25+00	199,000
		Stations 240+00 to 267+00	368,000
2012	Nourishment	Stations 10+00 to 25+00	140,000
		Stations 235+00 to 260+00	210,000
2014	Berm	Nearshore Berm	305,000
¹ Survey station numbers represent distance in feet from Brazos Santiago Pass north jetty (see Figure 1).			
² Material placed in nearshore berm after 1995 includes sediments dredged from reaches of the channel containing a high percentage of silt and clay.			

Addition of sand to the beach has reduced fluctuations in shoreline change within the SPI city limits by approximately half. Data from annual beach profile surveys between 1995 and 2015, record an average change rate of 2.33 ft/yr (HDR 2015).

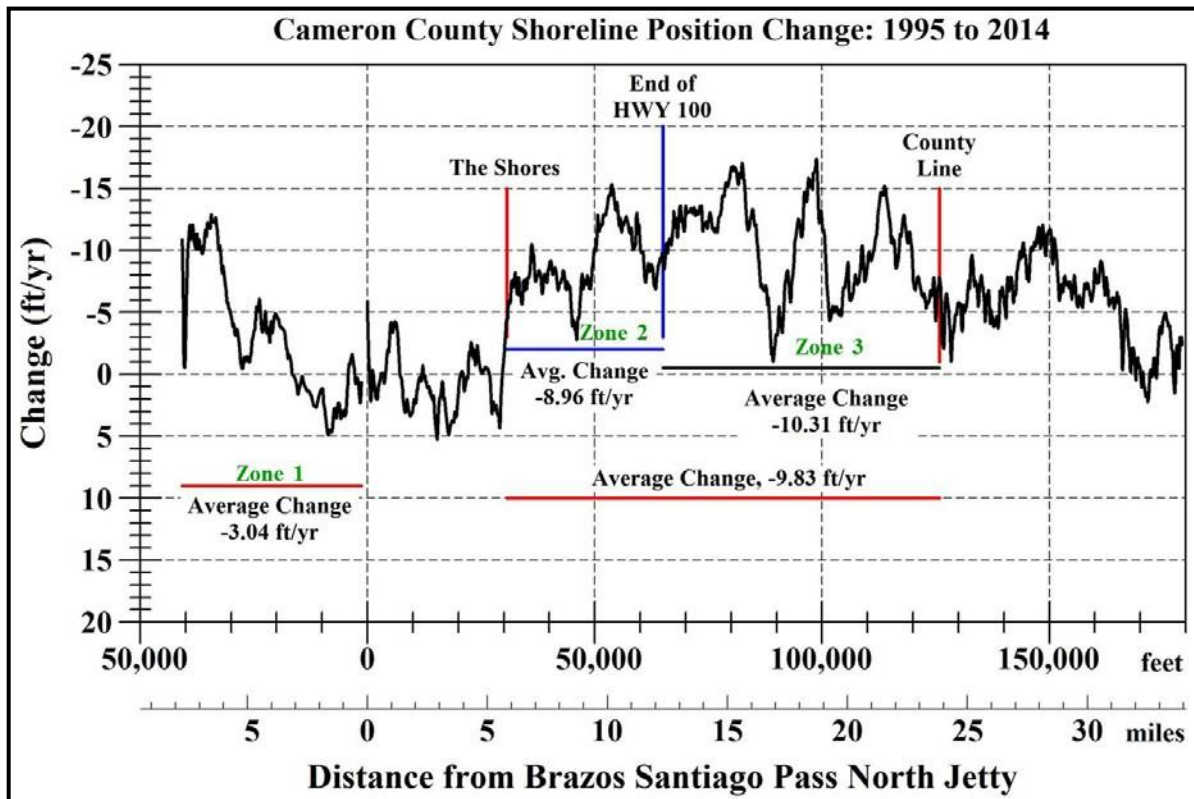


Figure 27 Post Sand Management shoreline change from 1995 to 2014. Besides the location of the BRAZOS SANTIAGO PASS north jetty (0 on the graph), three reference locations denote the northern limit of the developed portion of SPI (The Shores), the northern limit of Highway 100, a

The Boca Chica reach (Zone 1) is net accretional within 3 miles of the BRAZOS SANTIAGO PASS south jetty. From this point south to the Rio Grande, net shoreline recession is dominant, resulting in an average shoreline change rate of -3 ft/yr for the Boca Chica reach (Figure 30), about 25 ft/yr less than the 1939 to 1995 period. Average shoreline change rates in Zones 2 and 3 illustrated substantial change relative to the previous time period; however, longshore variations in beach changes were less dramatic. Average shoreline change for Zone 2 was -9.0 ft/yr, whereas average change north of Highway 100 to the county line was -10.3 ft/yr. Fairly consistent average shoreline erosion rates on undeveloped Cameron County beaches persisted since 1939, indicating that SPI sand management practices are more localized between 1995 to 2014. As sand management practices continue along the developed beach of SPI, sand may be transported north to the benefit of beaches north of The Shores.

2.3.1.3 - 1939 to 2014

Based on shoreline change results from the previous two time periods, the entire period of record, during and after engineering activities, was analyzed to establish average beach erosion trends.

Although small variations in average shoreline change rates between periods was documented for each zone, the long-term, less variable erosion record was selected to estimate average shoreline change rates for undeveloped Gulf beaches in Cameron County to establish reasonable setback distances for restricting construction and establishing dune habitat.

South of Brazos Santiago Pass (Zone 1), shoreline change rates averaged about -5.0 ft/yr with consistent accretion within 3 miles of the south jetty (Figure 31). North of the City of SPI, average shoreline change was about -9.9 ft/yr in Zone 2 and -11.9 ft/yr in Zone 3. Although short-term shoreline change rates (1995 to 2014) were slightly lower than long-term changes, all average change rates are consistent for each of the analysis periods (Table 4). The 1939 to 2014 period provides long-term shoreline change rates that encompass a wide range of event-driven processes, contain less short-term variability, and maintain average change characteristics for all periods.

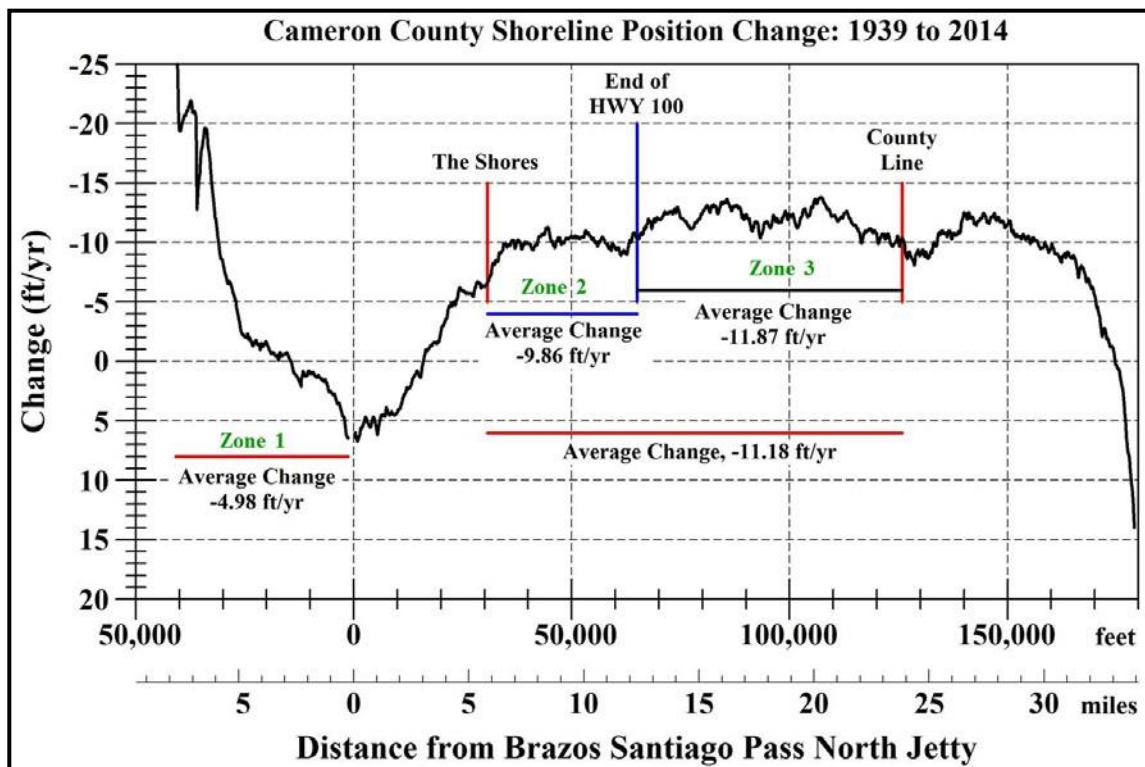


Figure 28 Shoreline position changes from 1939 to 2014. Besides the location of the BRAZOS SANTIAGO PASS north jetty (0 on the graph), three reference locations denote the northern limit of the developed portion of SPI (The Shores), the northern limit of Highway 100, and the County

Table 4. Location zone and average shoreline change rates since 1939.				
Dates	Description	Location (Zone)		
		Average Change (ft/yr)		
		1*	2	3
1939-1995	Engineering Alterations	-5.55	-10.21	-12.46
1995-2014	Post Sand Management	-3.04	-8.96	-10.31
1939-2014	Post man-made activities Beach/Dune Management	-4.98 -5	-9.86 -10	-11.87 -12

*Does not include Isla Blanca Park

Appendix E – Construction Certificate Checklist and Additional Requirements for Exemption Petition for Construction Seaward of the Building Setback Line

Construction Certificate Checklist

1) Copy of Application for a Beachfront Construction Certificate & Dune Protection Permit

2) Detailed Site Plan

- ☐ Show all proposed improvements, proposed dune alternations, and pre-construction and post-construction dune contours at 1-foot intervals, and the projected shoreline position
- ☐ The surveyed Line of Vegetation subject to review and approval by the Land Office;
- ☐ The surveyed line of mean higher high water (MHHW)
- ☐ The surveyed location of the building setback line and buffer area as defined herein
- ☐ The future projected shoreline position at 10, 20, 30 and 50 years from the year of the application, based on multiplying the erosion rate for the parcel times the number of applicable years covering an area of at least 1,000 feet on either side of the parcel and including the parcel
- ☐ One-foot dune elevation contours within the parcel and within the area of construction impact
- ☐ The extent of vegetative cover expressed as a percentage of the area or sub-area and in square footage, (documented by color photos and the survey) on the parcel and within the area of construction impact
- ☐ Complete calculation of all impacts to dune volume (cubic yards) and dune vegetation (square footage) of the project

Δ

3) Dune Mitigation Plan

- └ Mitigation for damage to dune volume and vegetation shall comply with all applicable standards in the Cameron County Beach Access & Dune Protection Plan, the Land Office Beach/Dune rules, (Texas Administrative Code, Title 31, § 15.4(f)), and this ERP.
- ☐ Dune plant mitigation shall be strictly limited to native dune plants
- ☐ All dune volume impacted, displaced or disturbed by the proposed construction must be used for mitigation and dune restoration seaward of the building setback line and shall not be used for construction fill or any other purpose
- ☐ Ensure mitigation of all impacts to dune volume and dune vegetation will be completed seaward of the building setback line
- ☐ Survey of the proposed mitigation area prior to modification
- ☐ Dune mitigation volume in cubic yards at a ratio of 1:1 of impact
- ☐ Dune vegetation area in square feet at a ratio of 1:1 of impact
- ☐ Proposed post-mitigation dune shape, location, height, width and contours

- proposed dune planting plan including the plant species to be installed on at least one foot on center, the plant source and location within the dune mitigation area, and the location and design of sand fencing, if applicable
- Where a Dune Mitigation Plan is required, the applicant shall provide the contact information and addresses for all landowners immediately adjacent to the tract and affirmation that the adjacent landowners will be provided with notice of the County Commissioners Court hearing at least 10 days prior to the hearing on the Application and Petition.

Additional Requirements for Exemption Petition for Construction Seaward of the Building Setback Line

5. For projects where the County is considering authorizing an exemption from the prohibition on construction seaward of the building setback line, the Petition and Application materials for construction must demonstrate that the conditions below will be met:
 - a. 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:
 - i. A minimum of two-foot freeboard above FEMA's BFE to the finished floor elevation of the lowest habitable floor;
 - ii. No enclosures below BFE;
 - iii. 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;
 - iv. Feasible relocation of any habitable structure; and
 - v. All construction shall be designed to minimize impacts to natural hydrology.
 - b. Location of all construction should be landward of the landward toe of the foredune ridge and as far landward as practicable.
 - c. The proposed development shall also comply with the current floodplain regulations in the County.
 - d. The structure must be elevated on pilings; slab on grade construction is prohibited;
 - e. The proposed construction must strictly comply with the requirements of the Cameron County ERP and Beach Access & Dune Protection Plan and the Land Office's Beach/Dune rules set forth in Title 31, Texas Administrative Code § 15;
 - f. The use of concrete or asphalt is prohibited under the footprint of the structure and for the construction of a driveway, parking area or road.

- g. In the area seaward of 230 feet from the line of vegetation, all roads, driveways, sidewalks and pathways shall be pervious and constructed with brick pavers, crushed limestone, gravel, or Truegrid pavers.
- h. The applicant will be allowed to place unreinforced fibercrete in 4-foot by 4-foot sections, 4 inches thick, separated by expansion joints, beneath the footprint of the habitable structure, not including the area under decks, only if the fibercrete is not structurally attached to the pilings and placement of fibercrete will be entirely undertaken, constructed, and located at least 25 feet from the landward toe of the foredunes. If no dunes exist, placement of fibercrete may only be undertaken, constructed, and located at least 100 feet landward of the line of vegetation, or landward of the building setback line, whichever distance is greater.
- i. Construction outside the perimeter of a habitable structure using concrete or other impervious surface with an area that does not exceed 5.0% of the footprint of the habitable structure may be authorized. Concrete curbs may be permitted as part of the 5.0% to preserve the integrity of permeable pavers. Curbs shall not be wider than 6 inches or more than 12 inches high/deep; limited concrete pads may also be permitted as part of the 5.0% if required for utilities, and they should be limited to the minimum dimensions required to meet applicable building codes.
- j. Mitigation for damage to dune volume and vegetation shall comply with all applicable standards in the Cameron County Beach Access & Dune Protection Plan, the Land Office Beach/Dune rules, (Texas Administrative Code, Title 31, § 15.4(f)), and this ERP. Mitigation impact analysis shall be further calculated and conducted as follows:
 - v. Dune volume mitigation shall be provided for all dune volume impacted;
 - vi. Dune plant mitigation shall be strictly limited to native dune plants;
 - vii. All dune impacts shall be mitigated on-site to the greatest extent practicable and all mitigation of dune volume and vegetation must occur seaward of the building setback line, even if off-site;
 - viii. All dune volume impacted, displaced or disturbed by the proposed construction must be used for mitigation and dune restoration seaward of the building setback line and shall not be used for construction fill or any other purpose;

Notwithstanding any other provisions, no seawalls, retaining walls, geo-tubes, clay-core dunes, or other structural shore protection projects or shoreline armoring structures may be constructed anywhere seaward of the building setback line.

- k. The site-specific erosion rates seaward of the parcel and at least 1,000 feet on either side of the parcel based on published data from the UT Bureau of Economic Geology;

- l. A detailed site plan showing all proposed improvements, proposed dune alternations, and pre-construction and post-construction dune contours at 1-foot intervals, and the projected shoreline position, including:
 - i. The surveyed Line of Vegetation subject to review and approval by the Land Office;
 - ii. The surveyed line of mean higher high water (MHHW);
 - iii. The surveyed location of the building setback line and buffer area as defined herein; and
 - iv. The future projected shoreline position at 10, 20, 30 and 50 years from the year of the application, based on multiplying the erosion rate for the parcel times the number of applicable years covering an area of at least 1,000 feet on either side of the parcel and including the parcel;
- m. A detailed site plan based on a recent survey of the parcel, including the following:
 - i. One-foot dune elevation contours within the parcel and within the area of construction impact;
 - ii. The extent of vegetative cover expressed as a percentage of the area or sub-area and in square footage, (documented by color photos and the survey) on the parcel and within the area of construction impact;
 - iii. Complete calculation of all impacts to dune volume (cubic yards) and dune vegetation (square footage) of the project;
 - iv. A dune mitigation plan ensuring mitigation of all impacts to dune volume and dune vegetation will be completed seaward of the building setback line;
 - v. The Dune Mitigation Plan shall include:
 - f) a survey of the proposed mitigation area prior to modification;
 - g) Calculation of dune mitigation volume in cubic yards at a ratio of 1:1 of impact. Total dune volume shall be calculated starting at the elevation of the base of the dune within the area of construction impacting the dunes;
 - h) Dune vegetation area in square feet at a ratio of 1:1 of impact;
 - i) The proposed post-mitigation dune shape, location, height, width and contours;
 - j) The proposed dune planting plan including the plant species to be installed on at least one foot on center, the plant source and location within the dune mitigation area, and the location and design of sand fencing, if applicable;

- n. An assessment of the risks to the structure, adjacent structures, utilities, and other improvements in the event of a 100-year storm event if the project is constructed as proposed and taking into account the proposed mitigation plan;
- o. An assessment of the risks to the structure, adjacent structures, utilities, and other improvements due to predicted shoreline retreat determined by multiplying the erosion rate times 10 years, 20 years, 30 years and 50 years;