CCRMA
CAMERON COUNTY REGIONAL MOBILITY AUTHORITY

South Padre Island

2nd Access Project

State Highway 100, across the
Laguna Madre, to Park Road 100

Cameron County, Texas

Volume I: Draft Environmental Impact Statement

May 2012

Texas Department of Transportation

DEPARTMENT OF TRANSPORTATION
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VOLUME I: DRAFT ENVIRONMENTAL IMPACT STATEMENT

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ABSTRACT

The proposed action, known as the 2nd Access Project, is located in Cameron County, Texas and would provide an alternate route connecting South Padre Island to the mainland of Texas. The proposed action consists of the construction of a new location highway facility (in sections), extending from State Highway (SH) 100 on the mainland to Park Road 100 on South Padre Island. The study area for the 2nd Access Project is located in eastern Cameron County and is defined as the area between San Roman Road to the west, the Gulf of Mexico to the east, northeast Brownsville to the southwest, South Bay to the southeast and rural South Padre Island to the north. Cities and towns within the study area include South Padre Island, Port Isabel, Laguna Heights, Laguna Vista, Brownsville and Bayview. The proposed action consists of three major components: the mainland roadways, the Laguna Madre crossing bridge and the island roadway. The mainland roadway component would consist of a four-lane facility within a 150-foot right-of-way (ROW) from SH 100 north to either Buena Vista Drive, Laguna Vista Drive or FM 510 (depending upon the alternative chosen) and a 400-foot ROW from the end of the 150-foot section to the Laguna Madre. The Laguna Madre crossing component, which would be access controlled and tolled, would consist of four lanes within a single 80-foot wide bridge. The island roadway component of the project would also consist of four lanes with sidewalks and would extend from the bridge to an interchange with Park Road 100 within a 400-foot ROW, then to the project terminus within the existing four-lane section of Park Road 100. Within the project limits, two additional Park Road 100 travel lanes would be constructed (one in each direction) – these lanes would be constructed within the existing Park Road 100 ROW. The proposed design speed is 60 miles per hour. Transportation improvements are needed in the 2nd Access Project study area in order to improve public safety, enhance local and regional mobility and provide the infrastructure to support economic development. Additionally, environmental sensitivity is an important component of the project need. The recommended preferred alternative was proposed in this draft environmental impact statement after evaluation of the potential environmental impacts and consideration of public and agencies' input. The recommended preferred alternative (Alternative 6) is one of 12 alternatives (11 build alternatives and the No-Build Alternative) evaluated and studied in detail in this draft environmental impact statement. The recommended preferred alternative was selected based on its ability to best meet the need and purpose of transportation improvements while minimizing impacts to the natural, physical and social environments. The recommended preferred alternative for the 2nd Access Project would require the acquisition of new ROW, resulting in impacts to floodplains, seagrasses, sand dunes, wildlife habitat and jurisdictional wetlands. Within the proposed ROW, no known hazardous materials, historic resources or archeological resources would be impacted. Required surveys for archeological resources have not been completed. These surveys would be conducted prior to construction to the extent required under federal and state cultural resource protection laws. The recommended preferred alternative would be evaluated to a higher level of detail in the final environmental impact statement following the public hearing and draft environmental impact statement circulation. A recommended preferred alternative would be chosen when the final environmental impact statement receives a record of decision.

Comments on this draft environmental impact statement are due by August 15, 2012 and should be sent to:

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EXECUTIVE SUMMARY

1.0 INTRODUCTION

The Cameron County Regional Mobility Authority (CCRMA), in cooperation with the Texas Department of Transportation (TxDOT) and the Federal Highway Administration (FHWA), has initiated development of a project that would provide an alternate route connecting South Padre Island and the mainland of Texas. The proposed 2nd Access Project would extend from State Highway (SH) 100 on the mainland to Park Road 100 on South Padre Island, Cameron County, Texas (**Exhibit ES-1**). SH 100 and Park Road 100 have been determined to be logical termini for the proposed project. Cities and towns within the study area include South Padre Island, Port Isabel, Laguna Heights, Laguna Vista, Brownsville and Bayview.

The proposed 2nd Access Project is being developed in anticipation of federal financial assistance; thus, the project is being developed in accordance with FHWA rules and regulations implementing the National Environmental Policy Act of 1969 (NEPA). The NEPA process for this project is utilizing mechanisms for streamlining the environmental process as outlined in 23 USC Section 139 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users. FHWA is the lead federal agency. CCRMA and TxDOT are co-lead agencies.

The proposed project is outside the Brownsville Metropolitan Planning Organization area and is currently unfunded. Due to limited availability of state and federal funding, TxDOT and CCRMA have decided to use tolling as a way to leverage additional funding; thereby, expediting delivery of the much needed 2nd Access Project. As currently proposed, only the crossing of the Laguna Madre and approaches would be tolled. Other sections of the proposed project would not be tolled. The toll collection system would be entirely electronic; thus, toll plazas would not be required and no cash or tokens would be needed. Toll collection equipment (cameras, strobe lights and vehicle identification sensors) would be supported approximately 20 feet above the roadway surface on structures called gantries. The gantries, which are structures similar in appearance to typical highway sign bridges, would be located at each end of the bridge. Auxiliary equipment needed to support the toll system would be housed in control cabinets located within the right-of-way (ROW) near the toll gantries.

CCRMA is a newly-established tolling authority with one active toll road (SH 550). The CCRMA adopted a full set of governing policies on January 14, 2010 and amended them on May 3, 2011. Policies established and adopted, to date, are available online at the CCRMA website:

http://cameroncountyrma.org/docs/CCRMA_Toll_Policies.pdf

The CCRMA is committed to ensuring accessibility to all potential users; thus, official policies would include prepayment provisions to accommodate those individuals that do not have access to bank accounts, credit card accounts or credit.

The CCRMA intends to utilize TxTAG as its primary electronic toll tag; although, it would also recognize and allow the use of toll tags issued by other Texas toll entities. In addition, video tolling will be available (although the objective of the toll operations procedures and policies created by the CCRMA is to increase the percentage of toll road customers who establish toll tag accounts). Because tolling is new to Cameron County, it is expected that some time would be required for customers to adjust to the toll road operations, rules and regulations. During a period of time to be determined by CCRMA staff following the initiation of CCRMA toll collection

operations, an incentive based, customer-friendly approach would be employed toward customers who use the road without paying toll charges. While it is understood that the objective of the CCRMA is to collect revenue and minimize toll violation abuse, CCRMA believes that a supportive approach toward customers who do not pay the toll initially would allow for a period of adjustment as customers begin using the new toll roads, and would ultimately lead to new toll customers for the CCRMA.

TxDOT would provide customer service to CCRMA customers and would support all operations related to customer toll tag account set-up, account maintenance and customer service. The cost to purchase an electronic toll tag has not yet been determined, but would be comparable to the cost of toll tags in other parts of the state.

Current toll policies include exemptions for two types of users;

(a) **Emergency and Military Vehicles**: In accordance with the provisions of Sec. 370.177, 362.901 and 541.201 of the Texas Transportation Code, CCRMA will create technical procedures to ensure that authorized emergency vehicles, as well as state and federal military vehicles, are exempt from paying tolls on the CCRMA toll road system.
(b) **Public Transportation Vehicles**: As authorized under the provisions of Sec. 370.177 of the Texas Transportation Code and to facilitate a multi-modal transportation system that ensures safe and efficient travel for all individuals in Cameron County, public transportation vehicles with a carrying capacity of 16 or more individuals that are owned and/or operated on behalf of the Brownsville Urban System shall be exempt from paying tolls on CCRMA toll facilities.

Additional policies are currently under development by the CCRMA. These policies would also establish toll rates applicable to high occupancy vehicles and motorcycles. At this time toll rates have not yet been set for these types of vehicles.

Construction would not begin until after receipt of the record of decision. Once initiated it is anticipated that construction would take three years to complete. The current estimated date of completion is 2015. The ROW, utility and mitigation costs are all site specific and cannot be accurately estimated at this time. Construction costs are estimated between $406-482 million, depending on the alternative.

1.1 PROJECT DESCRIPTION

South Padre Island is located at the southern tip of Texas, on the eastern edge of Cameron County, approximately 8 miles north of the Mexican border. The island is approximately 34 miles long from the Port Mansfield Channel to Brazos Santiago Pass at the southern end of the island and approximately 0.5 mile wide within the City of South Padre Island and approximately 3 miles wide at its widest point. The Queen Isabella Memorial Causeway is the only roadway access to South Padre Island. There are three major roadways that feed traffic onto the Queen Isabella Memorial Causeway and South Padre Island (**Exhibit ES-2**): Farm-to-Market Road (FM) 510, SH 100 and SH 48.

The island is linked to the mainland by the Queen Isabella Memorial Causeway, which was constructed just north of the original Queen Isabella Causeway in 1974. The Queen Isabella Memorial Causeway is a four-lane, 2.5 mile long bridge connecting Port Isabel to the southern end of South Padre Island. Due to high numbers of visitors to South Padre Island throughout the year, the Queen Isabella Memorial Causeway experiences severe congestion during peak

periods. Traffic demand is found to be highest during the summer months and peaks during the spring break period. Congestion during these times can be exacerbated by traffic accidents on the bridge or other incidents that could result in the incapacitation of the Queen Isabella Memorial Causeway. The two very notable, high profile incidents have occurred since the construction of the Queen Isabella Memorial Causeway. The first incident occurred in 1994 when a small plane crashed into the Queen Isabella Memorial Causeway and forced its closure for several hours. The second incident occurred on September 15, 2001 when four loaded barges crashed into one of the Queen Isabella Memorial Causeway's support columns. Three 80-foot sections of the bridge fell into the water leaving a large gap in the roadway, causing eight deaths. The bridge was closed for two months while repairs were made, and state officials brought in ferries from Port Aransas and Galveston, Texas, to temporarily carry cars across the Laguna Madre. The collapse had a significant economic impact on the region since the Queen Isabella Memorial Causeway is the only road connecting the island to the mainland.

The proposed 2nd Access Project would be a controlled access, transportation facility that would extend from SH 100 on the mainland to Park Road 100 on South Padre Island as shown in **Exhibit ES-3**. The proposed project consists of three major components: the mainland roadway, the Laguna Madre crossing bridge and the island roadway. The proposed design speed is 60 miles per hour.

The mainland roadway component would consist of a four-lane facility within a 150-foot ROW from SH 100 north to either Buena Vista Drive, Laguna Vista Drive or FM 510 (depending upon the alternative chosen) and a 400-foot ROW from the end of the 150-foot section to the Laguna Madre.

The Laguna Madre crossing component, which would be access controlled and tolled, would consist of four lanes within a single 80-foot wide bridge.

The island roadway component of the project would also consist of four lanes and would extend from the bridge to an interchange with Park Road 100 within a 400-foot ROW, then to the project terminus within the existing four-lane section of Park Road 100. Within the project limits, two additional Park Road 100 travel lanes would be constructed (one in each direction) – these lanes would be constructed within the existing Park Road 100 ROW. Sidewalks are also proposed on the island.

The proposed 2nd Access project would enhance safety and mobility by providing an alternative route to/from the island (minimizing dependence on the existing Queen Isabella Memorial Causeway) while providing the transportation infrastructure necessary to support the economic development goals of local entities. Local communities also desire additional access to the island in order to encourage more visitors through easier access which would positively impact the tourism-driven economy.

2.0 NEED AND PURPOSE FOR THE PROPOSED PROJECT

The draft need and purpose statement for the proposed 2nd Access Project was presented to the agencies and public at the first public scoping meeting in May 2008. As presented, the draft need and purpose statement included the following five distinct components:

- Improve Public Safety;
- Enhance Local and Regional Mobility;
- Provide the Infrastructure Necessary to Support Economic Development;

- Timely Implementation; and
- Environmental Sensitivity.

After receiving comments from agencies and the public, the five-component need and purpose (as outlined above) was approved by the FHWA and presented at the October/November 2008 agency and public scoping meetings.

It should be noted that during review/processing of the draft environmental impact statement it was determined that "timely implementation" is not a project need, but rather an FHWA goal with regard to all transportation improvement projects; the need and purpose was modified accordingly.

Although, as reflected subsequently in this document, timely implementation is no longer considered to be a project need, timely implementation remains an important objective of the proposed 2nd Access Project. Timely implementation of the proposed project is key to providing safe and efficient hurricane evacuation and improved emergency access; thus, minimizing the risk of loss of lives. Further, timely implementation is fundamental to achieving the mobility and economic development benefits of the proposed project; thus, improving quality of life in and around the project area.

For each of the remaining need and purpose components, specific evaluation criteria and performance measures were developed, as presented in **Table ES-1**.

Table ES-1: Evaluation Criteria

Need and Purpose	Criteria	Measurement of Criteria
Improve Public Safety	Provides emergency evacuation route	Provide access to other emergency evacuation routes as defined by the Texas Department of Public Safety.
	Provides emergency response route	Provide a method that allows improved access for emergency vehicles.
Enhance Local and Regional Mobility	Provides alternative route to South Padre Island	Provide access to South Padre Island in the event the Queen Isabella Memorial Causeway was closed to traffic.
	East-West system connectivity in area	Provide access to primary east-west traffic corridors in the study area.
Provide the Infrastructure Necessary to Support Economic Development	Supports existing economic development	Provides access to existing communities and businesses on the mainland and South Padre Island.
	Consistent with local development plans	Provides access to future communities and businesses on the mainland and South Padre Island. Results in positive local and regional economic impacts relating to construction activities, land use plans and property tax base.
	Consistent with regional development plans	Consistent with regional transportation and development plans
Environmental Sensitivity	Minimizes impacts to mainland development	Would not require major displacements of developed properties
	Minimizes impacts to South Padre Island development	Would not require major displacements of developed properties
	Impacts to wildlife refuges, historic areas, parks, etc.	Does not impact known wildlife refuges, historic areas, parks, etc.
	Maintain a valuable fishery in the area	Minimizes impacts on essential fish habitat within the Laguna Madre.
	Maintain biodiversity habitat in support and enhancement of the local ecotourism industry	Minimizes impacts to threatened and endangered species habitat.
	Public input	Input from public meetings is incorporated.

Note: The need and purpose/criteria/performance measures shown here reflect modifications to the need and purpose occurring after the public scoping process (see explanation in Chapter 1, Section 1.2). However, the modifications did not alter the results of the alternatives evaluation process.

Using these criteria, each alternative was assessed to determine if it met or failed to meet the criteria (and, thus, the need and purpose for the proposed project). A specific effort was made to develop the criteria in a manner that provided a binary response. By providing a "meets" or "fails to meet" response to each category, responses that fall into an intermediate "gray" area would be avoided.

2.1 NEED FOR THE 2ND ACCESS PROJECT

The need for the proposed 2nd Access Project, which may also be viewed as the problem to be addressed by the proposed project, is the result of having only a single point of access to and from the island. This limited access restricts traffic flow during emergency evacuations, such as hurricanes, and limits options for medical transport from the island to hospitals and health care facilities on the mainland. Restricted access also limits the economic development potential of the area while contributing to elevated congestion levels and decreased mobility (on the island and between the island and the mainland). The effects of these issues will be further compounded as the population of the island and the adjacent areas increase in the future. To promote timely implementation of the 2nd Access Project, portions of the proposed project would

be a tolled facility.

2.1.1 Improve Public Safety

There are multiple concerns regarding the safety of having only one access to the island. For example, a hurricane bearing toward South Padre Island would require the evacuation of the entire island. It is important that an evacuation be done without delays or major incidents. In emergencies, gridlock can occur on the island, as well as on the mainland when all outbound traffic utilizes the Queen Isabella Memorial Causeway and SH 100.

2.1.2 Enhance Local and Regional Mobility

The second category evaluates the project's ability to provide independent access points to facilitate movement between the mainland and the island. This connection must also be consistent with the regional transportation plans to establish an east-west corridor between the Brownsville/Harlingen area and the study area. The proposed 2nd Access Project should not only provide an alternative route to and from the island, but also provide enhanced connectivity to established east-west corridors.

The Queen Isabella Memorial Causeway can be shut down for hours due to traffic accidents or vehicle breakdowns. In addition, lane closures (not complete shutdowns) are required for maintenance activities. Data obtained from the South Padre Island Police Department documented six closures of the causeway for various (non-traffic crash) reasons and 11 partial closures (involving one or more lanes) due to traffic crashes from 2008-2010.

These events can limit, if not eliminate, access to or from the island. The proposed project would provide an alternate access as well as east-west connectivity within the region by providing connections to FM 510, SH 100 and Park Road 100. The proposed project would also provide improved connectivity to the local road network.

2.1.3 Provide the Infrastructure Necessary to Support Economic Development

The third category evaluates the economic development impacts of the proposed 2nd Access Project. Tourism in the study area and tourism-based businesses continue to grow. Three criteria were developed to assess the project's impact on the local and regional economic development. These include: supports existing economic development, consistent with location development plans, and consistent with regional development plans.

2.1.4 Environmental Sensitivity

The project area is environmentally sensitive. Within the study area, there are wildlife sanctuaries, coastal preserves, national wildlife refuges and colonial waterbird rookery areas. The most notable of these is the Laguna Atascosa National Wildlife Refuge (LANWR), which is home to 13 confirmed resident ocelots, an endangered species. The South Padre Island Birding and Nature Center is also located within the study area.

Sensitive species associated with the Texas Gulf Coast area include marine, estuarine and terrestrial species such as sea turtles, the Northern Aplomado Falcon and Piping Plover. In addition, several rare and endangered plants such as Vasey's adelia, star cactus, Texas ayenia, Runyon's cory cactus, Green Island echeandia, Runyon's water-willow and Shinner's rocket are found nowhere else except the South Texas Gulf Coast and Lower Rio Grande Valley area. Threatened and Endangered species of the project area are listed in **Table 3-25**.

South Padre Island is an important migratory bird fallout area for trans-gulf migratory birds from southern Mexico and Central America. The island is a landfall for these neotropical and nearctic birds and provides critical resting and feeding habitats. The Laguna Madre is located in between the mainland and South Padre Island and is a hypersaline lagoon (saltier than the ocean). It is one of only six known hypersaline lagoons on earth. The Laguna Madre is an important breeding ground for many aquatic birds, and acts as a wintering and stopover area for numerous species.

Seagrasses within the Laguna Madre provide habitat for threatened and endangered sea turtles and provide nursery habitat for many commercially and recreationally valuable aquatic species. The extremely shallow seagrass areas also provide excellent feeding grounds for winter duck populations. The extremely shallow seagrass areas also provide excellent feeding grounds for wintering red-headed ducks; the Laguna Madre is the largest red-headed duck wintering area in the world (80% of the population winter here). In the summer months, the Laguna Madre acts as a nursery area for young brown shrimp.

The tourist-based economy of the study area relies heavily on natural environmental features to attract visitors to the area. Protection of the area's natural environmental resources is critical in order to preserve the long term economic vitality of the area. According to a 2011 study done by South Texas Nature Marketing Coop, the total annual expenditures by visitors in the valley who come specifically to bird or for other watchable wildlife activities spend approximately $300 million per year.

2.2 PURPOSE OF THE 2ND ACCESS PROJECT

The purpose of the proposed 2nd Access Project is to facilitate congestion management during peak travel periods and emergency evacuations, enhance safety and mobility (both locally and regionally), provide the infrastructure necessary to support economic development, and to deliver the much needed transportation system improvements in an environmentally sensitive manner.

The importance of this purpose is underscored by the September 15, 2001 collapse of several spans the Queen Isabella Memorial Causeway. This accident disabled the sole vehicular access to South Padre Island; therefore, the island was isolated for several days until a ferry could be established to transport residents and tourists between the mainland and South Padre Island.

2.3 ALTERNATIVES ANALYSIS

2.3.1 Alternatives Development Process

The route alternatives development process for the proposed 2nd Access Project occurred in four distinct phases. The first phase involved the identification of a "universe of alternatives". During the second phase, the universe of alternatives was narrowed to "preliminary alternatives". In order to reduce the universe of alternatives into a suite of preliminary alternatives, each alternative was screened against three secondary screening criteria to determine if the alternative was viable: 1) Section 4(f) lands, 2) Coastal Barrier Resources Act lands, and 3) redundant landings. Alternatives not eliminated by the secondary screening criteria were designated as a preliminary alternative. Preliminary alternatives were evaluated in the third phase and "reasonable alternatives" identified. Reasonable alternatives were developed by determining whether or not the preliminary alternatives supported the need and purpose of the 2nd Access Project. The rationale for utilizing the need and purpose is that any

alternative that does not meet the need and purpose of the project would eventually be rejected; if it does not meet the need and purpose it fails to address the problem it was designed to solve. The fourth, and final, phase involved the evaluation of the reasonable alternatives in order to identify a "recommended preferred alternative".

In addition to identifying and evaluating route alternatives, modal options were also evaluated for their ability to meet the need and purpose of the project. Modal options include rail transit, ferry system, roadway (tunnel) and roadway (bridge). Other strategies included high occupancy vehicle lanes, bus transit, bicycle and pedestrian access, traffic demand management and traffic system management.

The roadway (bridge) modal option is equal to or superior to the other options for each of the project's purpose statements. It improves public safety and mobility; facilitates congestion management and economic development; and can be constructed in an environmentally sensitive manner. Finally, construction of the roadway (bridge) transportation mode type does not preclude development of another mode option in the future, as part of a separate study and project should the need be identified. The roadway (bridge) option is the proposed modal solution.

A total of 11 end-to-end alternatives were determined to be reasonable. The reasonable alternatives are also illustrated in **Exhibit ES-3**. Each of the reasonable alternatives, plus the No-Build Alternative, is evaluated in this draft environmental impact statement.

2.3.2 Alternative Descriptions

2.3.2.1 Alternative 1

Alternative 1 includes improvements to Park Road 100 starting at the end of the existing four-lane section near Andy Bowie Park and extending north for approximately 4.3 miles. Approximately 0.6 mile south of its northernmost extent on Park Road 100, Alternative 1 would extend from Park Road 100 approximately 8.3 miles southwest across the Laguna Madre, crossing the Gulf Intracoastal Waterway between mile markers 657 and 658, until connecting with Center Line Road on the mainland. Alternative 1 would then extend west along and include improvements to Center Line Road for approximately 2.1 miles, until turning southwest 0.9 mile and west 0.4 mile to an intersection with Buena Vista Drive. Alternative 1 would then extend south approximately 3.5 miles along and include improvements to Buena Vista Drive, crossing FM 510 and terminating at SH 100 approximately 9.1 miles west of Port Isabel. The total length of Alternative 1 is approximately 19.4 miles.

2.3.2.2 Alternative 2

Alternative 2 includes improvements to Park Road 100 starting at the end of the existing four-lane section near Andy Bowie Park and extending north for approximately 4.3 miles. Approximately 0.6 mile south of its northernmost extent on Park Road 100, Alternative 2 would extend from Park Road 100 approximately 8.3 miles across the Laguna Madre crossing the Gulf Intracoastal Waterway between mile markers 657 and 658, until connecting with Center Line Road on the mainland. Alternative 2 would then extend west along and include improvements to Center Line Road for approximately 0.5 mile, until turning south for 2.8 miles, crossing FM 510 at the existing Holly Beach Road intersection and continuing 1.5 miles south and southwest around El Tular to terminate at SH 100 approximately 7.4 miles west of Port Isabel. The total length of Alternative 2 is approximately 17.4 miles.

2.3.2.3 Alternative 3

During the refinement of the alternatives, Alternative 3 was introduced as a modification to Alternative 1. Alternative 3 includes improvements to Park Road 100 starting at the end of the existing four-lane section near Andy Bowie Park and extending north for approximately 4.3 miles. Approximately 0.6 mile south of its northernmost extent on Park Road 100, Alternative 3 would extend from Park Road 100 approximately 8.3 miles southwest across the Laguna Madre, crossing the Gulf Intracoastal Waterway between mile markers 657 and 658, to a landing site south of Center Line Road. Alternative 3 would then extend southwest for approximately 2.4 miles and west for approximately 1.0 mile until intersecting with Buena Vista Drive near the intersection of FM 510. Alternative 3 would then extend south approximately 2.9 miles along and include improvements to Buena Vista Drive to its terminus at SH 100 approximately 9.1 miles west of Port Isabel. The total length of Alternative 3 is approximately 19.0 miles.

2.3.2.4 Alternative 4

Alternative 4 includes improvements to Park Road 100 starting at the end of the existing four-lane section near Andy Bowie Park and extending north for approximately 3.2 miles. Approximately 0.4 mile south of its northernmost extent on Park Road 100, Alternative 4 would extend from Park Road 100 approximately 7.9 miles southwest across the Laguna Madre, crossing the Gulf Intracoastal Waterway south of mile marker 658, until connecting with Center Line Road on the mainland. Alternative 4 would then extend west along and include improvements to Center Line Road for approximately 2.1 miles, until turning southwest 0.9 mile and west 0.4 mile to an intersection with Buena Vista Drive. Alternative 4 would then extend south approximately 3.5 miles along and include improvements to Buena Vista Drive, crossing FM 510 and terminating at SH 100 approximately 9.1 miles west of Port Isabel. The total length of Alternative 4 is approximately 18.0 miles.

2.3.2.5 Alternative 5

Alternative 5 includes improvements to Park Road 100 starting at the end of the existing four-lane section near Andy Bowie Park and extending north for approximately 3.2 miles. Approximately 0.4 mile south of its northernmost extent on Park Road 100, Alternative 5 would extend from Park Road 100 approximately 7.9 miles southwest across the Laguna Madre, crossing the Gulf Intracoastal Waterway south of mile marker 658, until connecting with Center Line Road on the mainland Alternative 5 would then extend west along and include improvements to Center Line Road for approximately 0.5 mile, until turning south for 2.8 miles, crossing FM 510 at the existing Holly Beach Road intersection and continuing 1.5 miles south and southwest around El Tular to terminate at SH 100 approximately 7.4 miles west of Port Isabel. The total length of Alternative 5 is approximately 15.9 miles.

2.3.2.6 Alternative 6

Alternative 6 includes improvements to Park Road 100 starting at the end of the existing four-lane section near Andy Bowie Park and extending north for approximately 3.2 miles. Approximately 0.4 mile south of its northernmost extent on Park Road 100, Alternative 6 would extend from Park Road 100 approximately 7.9 miles southwest across the Laguna Madre, crossing the Gulf Intracoastal Waterway north of mile marker 659 and making its landing approximately 800 feet south of Holly Beach Road. Alternative 6 would then extend approximately 3.7 miles to the west until intersecting with Buena Vista Drive near the intersection of FM 510. Alternative 6 would then extend south 2.9 miles along and include

improvements to Buena Vista Drive to its terminus at SH 100 approximately 9.1 miles west of Port Isabel. The total length of Alternative 6 is approximately 17.6 miles.

2.3.2.7 Alternative 7

Alternative 7 includes improvements to Park Road 100 starting at the end of the existing four-lane section near Andy Bowie Park and extending north for approximately 3.2 miles. Approximately 0.4 mile south of its northernmost extent on Park Road 100, Alternative 7 would extend from Park Road 100 approximately 7.9 miles southwest across the Laguna Madre, crossing the Gulf Intracoastal Waterway north of mile marker 659 and making its landing approximately 800 feet south of Holly Beach Road. Alternative 7 would then extend approximately 1.3 miles to the west until turning south for approximately 1.3 miles, crossing FM 510 at the existing Holly Beach Road intersection and continuing approximately 1.5 miles south and southwest around El Tular to terminate at SH 100 approximately 7.4 miles west of Port Isabel. The total length of Alternative 7 is approximately 15.2 miles.

2.3.2.8 Alternative 8

Alternative 8 includes improvements to Park Road 100 starting at the end of the existing four-lane section near The Shores development and extending approximately 0.38 mile to the north. Approximately 0.04 mile south of its northernmost extent on Park Road 100, Alternative 8 would extend from Park Road 100 approximately 7.9 miles west across the Laguna Madre, crossing the Gulf Intracoastal Waterway south of mile marker 659, until connecting with Center Line Road on the mainland. Alternative 8 would then extend west along and include improvements to Center Line Road for approximately 2.1 miles, until turning southwest 0.9 mile and west 0.4 mile to an intersection with Buena Vista Drive. Alternative 8 would then extend south approximately 3.5 miles along and include improvements to Buena Vista Drive, crossing FM 510 and terminating at SH 100 approximately 9.1 miles west of Port Isabel. The total length of Alternative 8 is approximately 15.1 miles.

2.3.2.9 Alternative 9

Alternative 9 includes improvements to Park Road 100 starting at the end of the existing four-lane section near The Shores development and extending approximately 0.38 mile to the north. Approximately 0.04 mile south of its northernmost extent on Park Road 100, Alternative 9 would extend from Park Road 100 approximately 7.9 miles west across the Laguna Madre, crossing the Gulf Intracoastal Waterway south of mile marker 659, until connecting with Center Line Road on the mainland. Alternative 9 would then extend west along and include improvements to Center Line Road for approximately 0.5 mile, until turning south for 2.8 miles, crossing FM 510 at the existing Holly Beach Road intersection and continuing approximately 1.5 miles south and southwest around El Tular to terminate at SH 100 approximately 7.4 miles west of Port Isabel. The total length of Alternative 9 is approximately 13.0 miles.

2.3.2.10 Alternative 10

Alternative 10 includes improvements to Park Road 100 starting at the end of the existing four-lane section near The Shores development and extending approximately 0.38 mile to the north. Approximately 0.04 mile south of its northernmost extent on Park Road 100, Alternative 10 would extend from Park Road 100 approximately 7.4 miles southwest/west across the Laguna Madre, crossing the Gulf Intracoastal Waterway north of mile marker 660, and making its landing approximately 800 feet south of Holly Beach Road. Alternative 10 would then extend approximately 3.7 miles to the west until intersecting with Buena Vista Drive near the intersection of FM 510. Alternative 10 would then extend south approximately 2.9 miles along

and include improvements to Buena Vista Drive to its terminus at SH 100 approximately 9.1 miles west of Port Isabel. The total length of Alternative 10 is approximately 14.4 miles.

2.3.2.11 Alternative 11

Alternative 11 includes improvements to Park Road 100 starting at the end of the existing four-lane section near The Shores and extending approximately 0.38 mile to the north. Approximately 0.04 mile south of its northernmost extent on Park Road 100, Alternative 11 would extend from Park Road 100 approximately 7.4 miles southwest/west across the Laguna Madre, crossing the Gulf Intracoastal Waterway north of mile marker 660, and making its landing approximately 800 feet south of Holly Beach Road. Alternative 11 would then extend approximately 1.3 miles to the west until turning south for approximately 1.3 miles, crossing FM 510 at the existing Holly Beach Road intersection and continuing 1.5 miles south and southwest around El Tular to terminate at SH 100 approximately 7.4 miles west of Port Isabel. The total length of Alternative 11 is approximately 12.0 miles.

2.3.2.12 No-Build Alternative

The No-Build Alternative does not satisfy the need and purpose of the proposed project; however, FHWA, TxDOT and Council on Environmental Quality (CEQ) guidelines for the preparation of environmental documents require that the No-Build Alternative be carried forward as the basis of comparison for all reasonable alternatives.

Under the No-Build Alternative, a second access would not be constructed, and traffic congestion and demand would continue to increase. Under the No-Build Alternative, it is assumed that the other projects included in the *CCRMA System Map* (CCRMA April 2008) would occur, as well as other TxDOT and local projects. Other planned projects, assumed in the No-Build baseline, include, but are not limited to:

- West Loop (West Parkway) – construct four lanes within the existing Union Pacific ROW;
- U.S. Highway (US) 77 – upgrade facility from Corpus Christi to Brownsville;
- FM 509 – new location extension from US 77 to FM 508/FM 509 intersection;
- East Loop – new location bypass around Brownsville to the east;
- SH 550 – limited-access toll facility on new location from approximately 0.7 mile north of FM 3248 to SH 48;
- Port Entrance Road – improved entrance to the Port of Brownsville;
- Outer Loop – from US 77 north of the Harlingen airport to the 2nd Access Project study area; and
- North Rail Relocation – new rail line in western Cameron County.

2.3.3 Evaluation of Reasonable Alternatives

The environmental criteria presented in **Table ES-2** were used to evaluate the potential impacts of the reasonable alternatives on the natural and human environment. Aerial photograph interpretation, field visits, and geographic information systems software were utilized to assess the environmental impact of each alternative. Additionally, input from the public, elected officials, and agencies were considered in the evaluation of alternatives. The reasonable alternatives were evaluated following the FHWA Technical Advisory T6640.8A guidance and other applicable regulations. Refer to **Section 2.4** for a summary of each environmental resource and anticipated impacts.

Table ES-2: Reasonable Alternatives Summary of Direct Impacts

Alternative	Piping Plover Habitat (acres)	Ocelot/ Jaguarundi Habitat[1] (acres)	Aplomado Falcon Habitat (acres)	Manatee and Sea Turtle Habitat (acres)	Wetlands (acres)								Land Use (acres)				
					Freshwater Pond	Forested/ Shrub	Man-made[2]	Seagrass[3]	Freshwater	Saltmarsh	Mud Flats/ Salt Flats	Open Water	Agricultural	Residential	Commercial	Undeveloped	Transportation
No-Build	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	1.03	14.48	240.40	104.29	0.84	0.00	104.77	27.61	6.25	0.00	16.67	73.01	131.10	0.00	2.09	103.00	156.45
2	13.93	4.79	168.58	104.29	0.00	0.00	41.73	27.61	38.13	0.00	17.70	73.01	53.33	31.70	0.15	142.83	122.19
3	13.93	69.75	233.95	105.02	0.00	0.00	0.00	21.40	35.32	0.00	19.80	73.64	86.70	0.00	2.08	149.99	147.80
4	13.44	14.57	240.40	113.26	0.84	0.00	104.77	41.08	6.23	2.32	13.53	71.05	131.10	0.00	2.09	96.91	132.57
5	13.44	4.79	168.58	113.26	0.00	0.00	41.73	41.08	38.11	2.32	14.56	71.05	53.33	31.70	0.15	136.74	98.31
6	13.54	107.82	248.10	112.82	0.00	0.46	0.00	40.45	11.64	2.36	13.76	70.46	91.91	0.00	2.08	146.59	130.76
7	13.54	31.99	135.50	112.82	0.00	0.00	5.32	40.45	22.26	2.36	14.79	70.46	17.47	31.70	0.15	140.75	98.69
8	0.00	13.58	240.41	76.78	0.84	0.00	104.77	47.94	6.23	0.00	5.37	72.63	131.10	17.99	2.09	64.73	74.53
9	0.00	4.79	168.59	76.78	0.84	0.00	110.08	47.94	5.98	0.00	6.21	72.63	53.33	49.68	0.15	104.57	40.26
10	0.00	119.34	247.97	72.75	0.00	0.46	0.00	43.87	11.64	0.00	5.05	68.78	91.92	17.99	2.08	114.13	72.71
11	0.00	31.99	135.52	72.75	0.00	0.00	5.32	43.87	22.26	0.00	6.08	68.78	17.47	49.69	0.15	108.30	40.64

[1]Ocelot/Jaguarundi habitat includes the total acreage of Light Brush and Dense Brush

[2]Man-made water features - shrimp farm and man-made pond next to South Padre Island Golf Club/Community

[3]Seagrass data is from a survey performed by HNTB (July 2009) - Appendix H

Table ES-2: Reasonable Alternatives Summary of Direct Impacts (continued)

Alternative	100-Year Floodplain (acres)	Displacements (total number)	Residential Proximity (acres)	Regional Geology (acres)				Vegetation Communities (acres)										Prime Farmland (acres)	Right-of-Way (acres)				Length (miles)	Estimated Total Project Cost (Millions)
				Qac	Qal	Qas	Qbr	Black Mangrove	Seacoast Bluestem-Gulfdune Paspalum	Light Brush	Dense Brush	Rangeland	Farmland	Riparian	Fence Line	Dune	Landscape		Proposed ROW	Existing ROW	Open Water	Total		
No-Build	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	$0 M
1	346.30	0	0.26	51.02	24.73	188.08	130.12	0.00	50.32	10.01	4.47	145.83	3.30	8.87	5.06	50.32	9.69	59.09	236.19	156.45	74.22	466.86	19.4	$535 M
2	359.25	2	90.63	22.19	24.73	174.42	130.12	0.00	50.32	2.89	1.90	209.18	0.00	2.09	1.36	50.32	9.69	5.10	227.97	122.19	74.22	424.38	17.4	$522 M
3	279.82	0	5.80	50.97	23.70	181.17	130.12	0.00	50.32	46.11	23.64	193.13	3.30	5.86	5.26	50.32	9.69	20.73	238.78	147.80	74.82	461.40	19.0	$534 M
4	314.48	0	0.26	51.02	40.90	188.08	84.40	0.13	0.00	10.10	4.47	152.22	3.30	8.87	5.06	28.31	9.69	59.09	230.10	132.57	72.37	435.04	18.0	$514 M
5	327.44	2	90.63	22.19	40.90	174.42	84.40	0.13	0.00	2.89	1.90	215.58	0.00	2.09	1.36	28.31	9.69	5.10	221.88	98.31	72.37	392.56	15.9	$501 M
6	236.48	0	5.79	50.61	40.04	196.97	84.40	0.13	0.00	75.47	32.35	171.94	3.30	5.60	6.45	28.31	9.69	2.72	240.59	130.76	71.84	443.19	17.6	$511 M
7	282.15	2	90.73	21.41	40.04	143.43	84.40	0.13	0.00	8.89	23.10	194.11	0.00	0.20	1.35	28.31	9.69	0.07	190.04	98.69	71.84	360.57	15.2	$493 M
8	244.84	0	37.98	51.02	23.90	188.09	31.08	0.02	0.00	9.11	4.47	112.18	3.30	8.87	5.06	0.00	10.65	59.09	220.19	74.53	70.70	365.42	15.1	$493 M
9	257.79	2	128.35	22.19	23.90	174.44	31.08	0.02	0.00	2.89	1.90	167.02	3.30	2.09	1.36	0.00	10.65	5.10	211.96	40.26	70.70	322.92	13.0	$480 M
10	162.86	0	43.51	50.61	22.87	196.97	31.08	0.02	0.00	75.47	32.35	131.66	3.30	5.60	6.45	0.00	10.65	2.72	230.39	72.71	66.51	369.61	14.4	$470 M
11	208.69	2	128.46	21.41	22.87	143.43	31.08	0.02	0.00	8.89	23.10	153.82	0.00	0.20	1.35	0.00	10.65	0.07	179.84	40.64	66.51	286.99	12.0	$452 M

Note: Residential Proximity (acres) - In addition to impacts associated with the conversion of land to ROW (such as displacements), community impacts would also occur due to proximity to the proposed facility. As a means of quantifying potential proximity impacts, the project team calculated the amount of existing and proposed residential property located outside of, but within 400 feet of, the ROW footprint for each alternative.

The No-Build Alternative does not satisfy the need and purpose of the proposed project; however, FHWA, TxDOT and CEQ guidelines for the preparation of environmental documents require that the No-Build Alternative be carried forward as the basis of comparison for all reasonable alternatives.

Alternatives 1, 2, 4 and 5 are located within 0.5 mile of the LANWR. These alternatives also bisect the Harlingen Shrimp Farm, fragmenting this facility. On the mainland side of the project area, the South Padre Island Golf Club/Community is expanding northwest of Laguna Vista. Alternatives 2, 5, 7, 9 and 11 would require the displacement of one of the residences in South Padre Island Golf Club/Community and one commercial building.

An intersection with Park Road 100 on the island near Andy Bowie Park could not be designed without impacts to either the park or to The Shores development. Impacts to the park would be a fatal flaw for the alternatives; therefore, the intersection impacts The Shores. Alternatives 8, 9, 10, and 11 would impact approximately 90 platted residential lots located at The Shores development on South Padre Island. In addition, Alternatives 9 and 11 would directly impact one commercial facility. Because of these various impacts, Alternatives 1, 2, 4, 5, 7, 8, 9, 10 and 11 were removed from consideration as the recommended preferred alternative.

The remaining alternatives, Alternatives 3 and 6, would not result in the displacement of residential or commercial properties, would minimize impacts to existing or proposed development, and would not impact the shrimp farm. Alternatives 3 and 6 would have similar impacts to Piping Plover critical habitat. Alternative 6 would impact approximately 38 more acres of potential ocelot habitat than Alternative 3. However, at the request of the U.S. Fish and Wildlife Service (USFWS), Alternative 6 was shifted into an area with more potential habitat in order to avoid impacting a known ocelot corridor. The pre-shift alignment is shown on **Exhibit 2-3**. The current alignment, as requested by the USFWS, is shown on **Exhibit 2-10**.

Alternative 3 still crosses the ocelot corridor which was avoided by Alternative 6 when it was shifted south at the request of the USFWS. Although Alternative 6 would potentially impact approximately 19 more acres of seagrass, Alternative 3 would have approximately 9 acres more potential impact to wetlands. Alternative 3 would also impact approximately 43 more acres of floodplain. Additionally, Alternative 3 is 1.4 miles longer and, based on this length, could be more costly to construct. Based on the difference between the potential impacts, Alternative 3 was removed from consideration as the recommended preferred alternative.

Based on a complete and thorough evaluation of the reasonable alternatives, as documented in **Chapter 4,** Alternative 6 is the recommended preferred alternative for the proposed South Padre Island 2nd Access Project.

2.3.4 Description of the Proposed Action

In conjunction with development of this environmental impact statement, an evaluation of possible modal solutions was undertaken. Based on the results of the modal evaluation, a roadway (bridge) solution was identified as the most effective means of addressing the need and purpose of the proposed project. Accordingly, a partially access controlled highway facility is proposed. The proposed facility would extend from SH 100 on the mainland to Park Road 100 on South Padre Island.

The proposed 2nd Access Project would consist of three major components: the mainland roadway, the Laguna Madre crossing and the island roadway. Tolling is proposed for the bridge

and bridge approaches. Controlled access is proposed within the limits of tolling; outside the limits of tolling, the project would be non-controlled access. The toll collection system would be entirely electronic; thus, toll plazas would not be required and no cash or tokens would be needed. Toll collection equipment (cameras, strobe lights and vehicle identification sensors) would be supported approximately 20 feet above the roadway surface on structures called gantries. The gantries, which are structures similar in appearance to typical highway sign bridges, would be located at each end of the bridge. Auxiliary equipment needed to support the toll system would be housed in control cabinets located within the right-of-way near the toll gantries.

Construction would not begin until after receipt of the record of decision. Once initiated it is anticipated that construction would take three years to complete. The current estimated date of completion is 2015. The ROW, utility and mitigation costs are all site specific and cannot be accurately estimated at this time. Construction costs are estimated between $406-482 million, depending on the alternative.

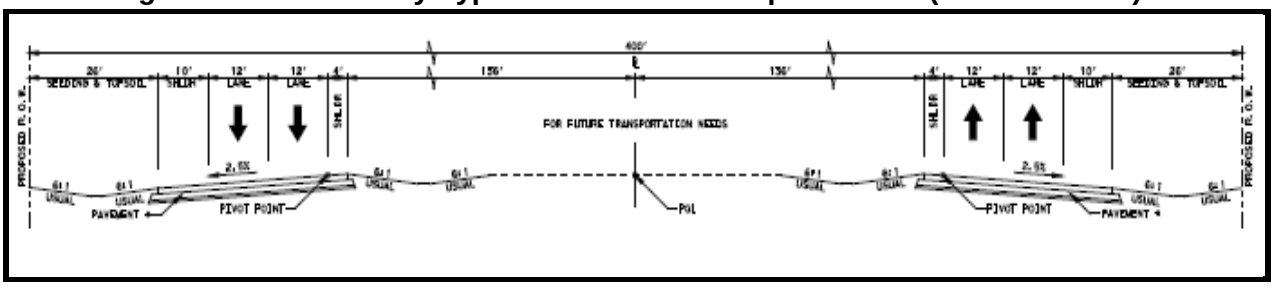
The following descriptions of the roadway typical section components reflect planning efforts, to date. As the project is developed further, minor refinements to the project concept could occur. Although these refinements could affect the typical sections, the refinements would not be expected to alter the results of the alternatives analysis or impacts analyses presented in this document.

2.3.4.1 Mainland Roadway Component

The mainland roadway component of the proposed 2nd Access Project involves two distinct typical sections.

As currently proposed, the first typical section (principal arterial-type) would require 400-feet of ROW with four 12-foot lanes (two lanes in each direction), a 270-foot median, 4-foot inside and 10-foot outside shoulders with open ditch drainage (**Figure ES-1**). The 270-foot median, which would be acquired by Cameron County under authority granted to counties by the Texas State Legislature, would separate travel lanes and be reserved for future transportation use. The 400-foot section is proposed from the Laguna Madre west to the intersection of the proposed project and the first major intersecting roadway. Depending upon the alternative selected, this would be Buena Vista Drive, Laguna Vista Drive or FM 510.

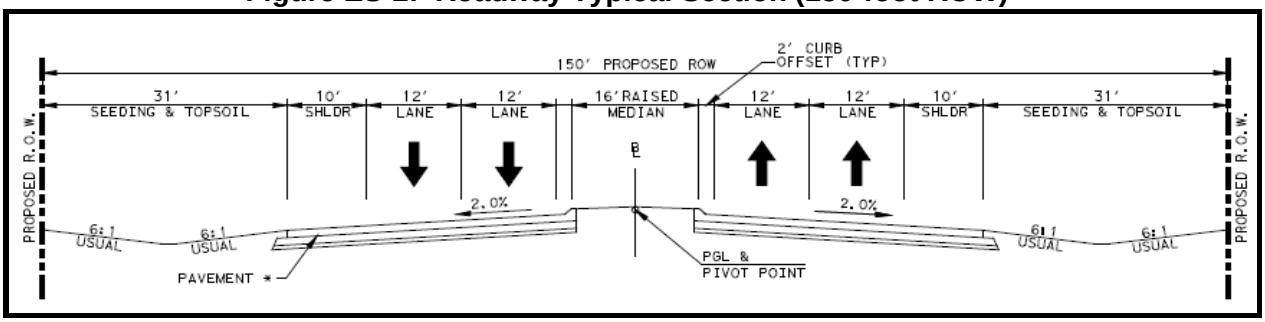
Figure ES-1: Roadway Typical Section – Principal Arterial (400-foot ROW)



As currently proposed, the second typical section would be composed of a 150-foot ROW containing four 12-foot lanes (two lanes in each direction), a 16-foot raised median, 2-foot curb offset on the inside and 10-foot outside shoulders with open ditch drainage (**Figure ES-2**). The 150-foot section would extend south from the end of the 400-foot section to SH 100 (the southern terminus of the proposed project). Due to the primarily rural nature of the mainland in

the location of the alternatives, pedestrian facilities are not included in the proposed project. However, the mainland ROW would be sufficient width to accommodate the addition of pedestrian facilities should future demand warrant construction. Possible addition of pedestrian facilities would be subject to environmental review and public involvement prior to construction.

Figure ES-2: Roadway Typical Section (150-foot ROW)

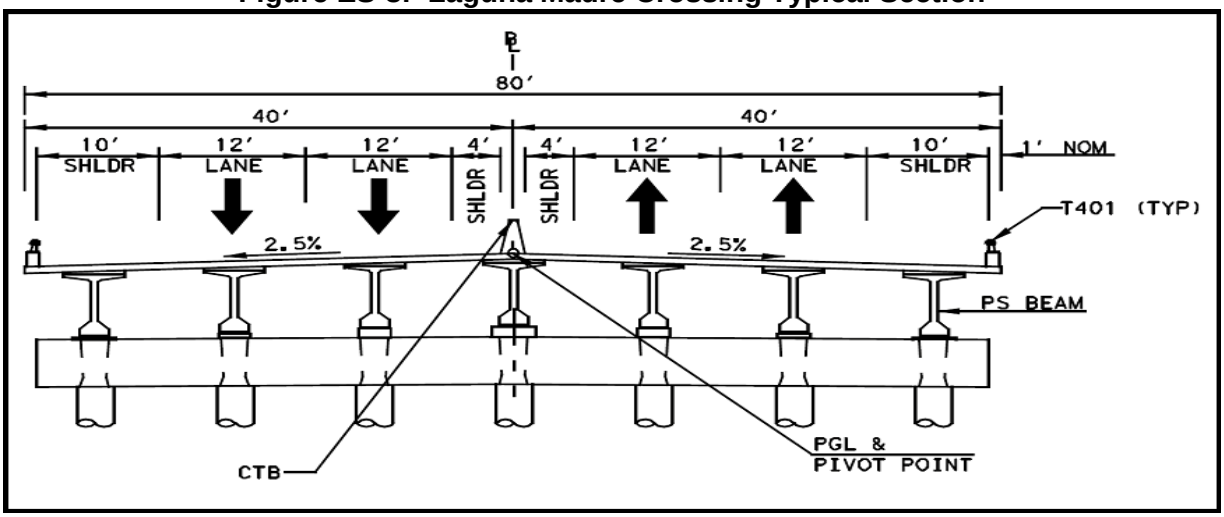


2.3.4.2 Laguna Madre Crossing Bridge Component

A bridge is proposed for the crossing of the Laguna Madre; however, due to the complexities associated with the extreme length of the proposed bridge, the exact design would be determined during the final design phase of the project (after a final decision on the environmental impact statement) rather than during the planning/environmental study phase. The structure, which would consist of a main span unit over the Gulf Intracoastal Waterway and approaches on each side of the main span, could take one of any number of forms.

For purposes of environmental study and this environmental impact statement, a single 80-foot wide bridge is assumed. It would consist of four 12-foot travel lanes (two lanes in each direction) and a concrete traffic barrier in the middle separating direction of travel. Four-foot inside and 10-foot outside shoulders are also proposed (**Figure ES-3**). Although a dedicated emergency lane is not proposed, the design of the roadway could accommodate emergency vehicles on the 10-foot outside shoulder.

Figure ES-3: Laguna Madre Crossing Typical Section



The proposed bridge would span the Gulf Intracoastal Waterway with a perpendicular (or near perpendicular) crossing of the navigation channel. The center span would be between 250 and

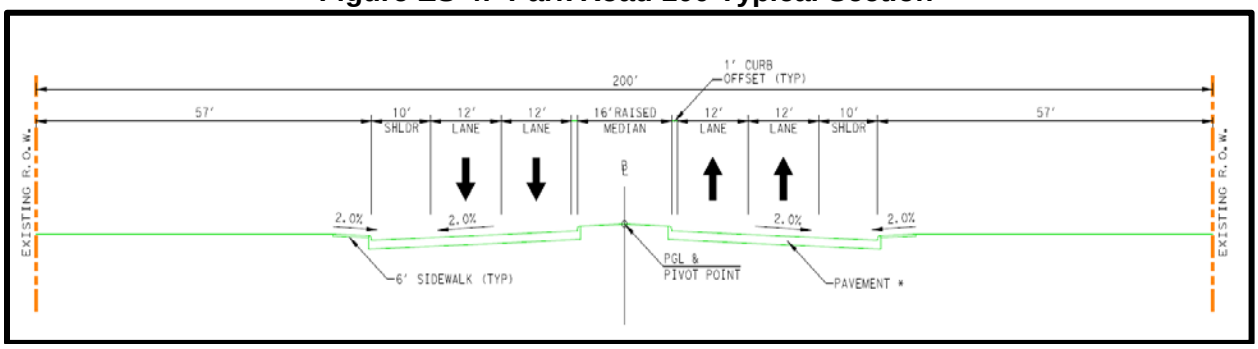
350 feet long. The bridge would have a minimum vertical clearance of 73-feet above mean high tide (equal to the vertical clearance of the existing Queen Isabella Causeway) with a minimum horizontal clearance of 125 feet from the center of the channel.

2.3.4.3 Island Landing Component

As is the case on the mainland, two typical sections are also proposed on the island. The first typical section would extend from the bridge to an intersection with Park Road 100. Within this area, the 400-foot typical section described above and shown in **Figure ES-1** is proposed.

The second typical section reflects improvements to Park Road 100 and would extend from the intersection of the 400-foot section (described above) south to the existing four-lane section of Park Road 100. Within this area, Park Road 100 would be reconstructed as a four-lane roadway. As currently proposed, Park Road 100 would consist of four 12-foot travel lanes (two in each direction), 10-foot shoulders, and 6-foot sidewalks. Directions of travel would be separated by a raised median (**Figure ES-4**). No additional ROW would be required to accommodate this section; the additional travel lanes would be constructed within the existing 200-foot ROW of Park Road 100.

Figure ES-4: Park Road 100 Typical Section



2.3.5 Potential Construction Methods

A variety of most likely construction methods may be considered for the 2nd Access Project implementation and this range of methods should provide flexibility to establish cost efficiency while maintaining environmental sensitivity. Access for bridge construction including delivery of equipment and materials to the new location site and means to install bridge structures across shallow waters of the Laguna Madre are key factors to be considered. Also, areas to receive and stage equipment and materials on South Padre Island, the mainland, and over the waterway will need to be established.

Some assumptions were used for all the reasonable alternatives in order to compare the various methods since there are still many unknown factors at this time in project development. The results of a bottom elevation survey, to be done at a later date, will enable a more accurate construction cost estimate to be developed. More refined construction methods and considerations will continue to develop through continued project coordination and permit coordination for the recommended preferred alternative following the public hearing and during preparation of the final environmental impact statement.

2.3.5.1 Bridge Types

The various construction methods will need to be tailored to the specific bridge type. Consideration of steel superstructures has been eliminated as long term maintenance issues

with steel corrosion in a harsh coastal environment make this type of structure not desirable. As such, pre-stressed concrete beams, pre-stressed concrete spliced girders, and segmental concrete bridges will be considered for bridge types. Based on similar bridge crossings, repeating causeway spans of approximately 140 feet are assumed with a 250-foot minimum main span required for the navigation channel. With the deep sands in Laguna Madre, pre-stressed pile foundations are assumed for substructure either as pile bents or waterline pile groups. The specific bridge type and span configuration; however, will be determined during the detailed design phase and as such may vary from these assumptions.

2.3.5.2 Construction Access

Regardless of selected bridge type, means to deliver materials to the site and erect the bridge over the waterway need to be considered. Potential most likely methods for construction include:

- Parallel dredging
- Parallel trestle
- Parallel sheet piling/haul road
- Top down or stepped out construction

Parallel Dredging

Dredging a parallel trench to the proposed bridge is an economical option for construction access. For dredging operations up front time would be required to dredge a channel for construction. However, once access is established, the project could be rapidly constructed from vessels in the waterway. Using a dredged parallel trench provides the least restrictive access for construction. Also, supply of equipment and materials from the waterway would significantly reduce construction impacts on roadway access to a heavily travelled tourist destination.

For dredging, a 12-foot deep trench is assumed with bottom width up to 140 feet. The total temporary easement required would be 160 feet. Total spoil material is estimated at 2.5 million cubic yards with an estimated construction impact of $25 million to project cost. The trench could remain in place after construction with natural infilling over time or the trench could be backfilled after construction is complete.

Impacts from dredging would be similar to current dredging in Laguna Madre that is performed to maintain the Gulf Intracoastal Waterway, although for the 2nd Access Project dredging would be a temporary impact.

Parallel Trestle

A parallel trestle used as a construction platform is a method that would limit the construction footprint. Steel piles would be driven into Laguna Madre with a pier-like trestle constructed just above the waterline. This parallel temporary bridge would be removed once the proposed bridge was complete. The total temporary easement required would be 80 feet.

Temporary construction trestles are more suited for shorter installation of less than ½ mile. For the 2nd Access Project the cost to construct a parallel trestle would be prohibitively expensive. Estimated cost to construct parallel trestles for the full length of the approaches to the navigation span would be approximately $100 million to install and remove after construction is complete.

Parallel Sheet Piling/Haul Road

Parallel access could also be established by using sheet piling with a filled haul road. The total temporary easement required would be 80 feet. Estimated cost to drive sheet piling and install a haul road would be approximately $120 million. This option would have significant impacts including forming a temporary barrier across the Laguna Madre, temporary removal of bottom vegetation, and disturbance upon removal of fill material. This option is one of the most expensive.

Top Down or Stepped Out Construction

Under this option the bridge is progressively constructed from land by overhanging successive spans from each of the previous ones in a linear manner. The total temporary easement required would be 20 feet. This method would require specialized gantries. Construction of the bridge would be limited by the rate at which a span could be completed and the gantry advanced. This method significantly impacts progression of work and potentially adds 1 to 2 years to construction time. For top down construction, span length may be constrained to less than optimum length resulting in up to 50% more piers in the Laguna Madre. With stepped out segmental construction longer spans could be provided; however, a segmental bridge would likely require larger waterline foundations with a much larger footprint within the Laguna Madre and have significant construction cost impacts. Cost for top down or stepped out construction methods is estimated to be higher than other construction methods.

Conclusions

The following table (**Table ES-3**) compares the construction methods based on difficulty of construction, access, supply route, temporary easement, cost, and impact to schedule.

Table ES-3: Comparison of Potential Construction Methods

Construction Methods	Impact to Laguna Madre	Construction Access	Supply Route	Temporary Easement	Cost	Schedule Impacts*
Dredging	Moderate	Favorable	Waterway	160 feet	$110 SF	30 to 42 months
Trestle	Low/Moderate	Some Limitations	Land	80 feet	$130 SF	36 to 48 months
Sheet Pile	High	Some Limitations	Land	80 feet	$140 SF	42 to 54 months
Top Down/ Stepped Out	Low	Limited	Land	20 feet	>$160 SF	42 to 54 months

Source: HNTB 2012
*If a combination of these methods are utilized, construction duration may change.

A combination of the options may provide a favorable approach. While a trestle or sheet piling haul road may be prohibitively expensive as a sole means of access, their use in combination with dredging may be viable. An access road using sheet piling/fill or a trestle may be useful for a limited length near shore in combination with a dredged access channel.

Construction of the bridge using a combination of bridge types might also be a favorable option. For example pre-stressed beam on pile bents may be the most appropriate bridge option for low level spans while segmental construction may be a feasible option for the navigation span.

The final construction method implemented will be based on a competitive bidding process and

the contractor would have some flexibility in construction methods and materials within limitations established by approved permits. The contractor would be responsible for obtaining any temporary permits needed and modifications to the USACE and USCG permit based on final construction plans.

2.4 ENVIRONMENTAL IMPACT OF THE BUILD ALTERNATIVES

Environmental impacts were either avoided or minimized to the maximum extent practicable during the development and screening of alternatives. The environmental impacts associated with the construction and operation of the proposed reasonable alternatives have been measured or projected and are summarized in this section. The information is divided into the following technical disciplines: land use; social and economic; traffic noise; air quality; prime farmland soils; water resources; ecological; cultural resources; hazardous materials; visual and aesthetic qualities; energy; construction impacts; and indirect and cumulative impacts. The recommended preferred alternative was selected utilizing the potential impacts to environmental resources. Each alternative was evaluated to assess its potential impact to each resource to determine its cumulative impact of the alignment on the resources as a whole. Alternative 6 was selected as the recommended alternative and consists of the combination of a Mainland component, an island component and a Laguna Madre crossing component.

2.4.1 Land Use

2.4.1.1 Compatibility with Local Plans and Policies

The No-Build Alternative would be incompatible with the *Town of South Padre Island, Texas, Comprehensive Plan* (Town of South Padre 2008) and the *Cameron County Regional Mobility Authority Strategic Plan, 2007–2011* (Cameron County Regional Mobility Authority [CCRMA] 2006). Both of these plans include specific reference to the proposed 2nd Access Project. Although the planning documents for the City of Port Isabel, City of Brownsville and Town of Laguna Vista do not include specific reference to the proposed project, these jurisdictions generally support the construction of the proposed 2nd Access Project and have formally stated support for the project during public scoping meetings, technical working groups, Context Sensitive Solutions community workshops and one-on-one meetings, as discussed in **Chapter 8**. If the proposed 2nd Access Project is not constructed, local plans would have to be modified to provide other means of mobility.

Local planning documents prepared for the project area emphasize the need for increased mobility and economic development of the region, and the proposed project is included in the *Town of South Padre Island, Texas, Comprehensive Plan* (Town of South Padre 2008) and the *Cameron County Regional Mobility Authority Strategic Plan, 2007-2011* (CCRMA 2006). The build alternatives are compatible with the principles expressed in the local planning documents. Both the *Town of South Padre Island, Texas, Comprehensive Plan* (Town of South Padre 2008) and the *Cameron County Regional Mobility Authority Strategic Plan, 2007–2011* (CCRMA 2006) include specific references to the proposed 2nd Access Project.

2.4.1.2 Direct Land Use Impacts

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although these projects would result in land use impacts, the extent of these impacts cannot be determined at this time. Under the No-Build Alternative, there would be no 2nd Access Project-related land use impacts.

The primary direct impact on land use from the build alternatives is the conversion of land to transportation ROW. All of the build alternatives would result in long-term changes in land use where existing land use would be converted to transportation ROW. The 11 reasonable alternatives would convert a range of approximately 175.60 acres (Alternative 11) to 240.59 acres (Alternative 6) from existing land uses to transportation ROW. The land uses anticipated to be predominantly impacted would be undeveloped land (ranging from approximately 64.73 acres to 149.99 acres) and agricultural (ranging from approximately 17.47 acres to 131.10 acres).

2.4.1.3 Utilities

The No-Build Alternative would not result in utilities impacts associated with the construction or operation of the proposed project.

Utilities within the project area include pipelines, cable, conduit, fiber-optic, water lines, sanitary sewer lines, cell towers and overhead transmission lines. The project team has coordinated with utility companies to obtain information and mapping on known utility systems within the project area. Known utilities would be mapped using geographic information systems and avoided to the extent practicable during the development of the recommended preferred alternative. Additional information would be gathered during schematic design development of the recommended preferred alternative to determine the potential impacts to utilities within the proposed ROW. Specific impacts to utilities would be determined during the final design phase of project development. Should impacts to utilities result in the relocation of certain facilities, the project sponsor (CCRMA) would coordinate with utility owners regarding roles and responsibilities regarding any required relocation. Every attempt would be made to accommodate proposed utility adjustments within the project ROW.

2.4.1.4 Coastal Barrier Resources Act

The No-Build Alternative would not result in Coastal Barrier Resources Act lands impacts associated with the construction or operation of the proposed project.

None of the reasonable alternatives would impact lands designated under the Coastal Barrier Resources Act; thus, there would be no direct impact to Coastal Barrier Resources.

2.4.1.5 Section 4(f) of the Department of Transportation Act of 1966

The No-Build Alternative would not result in Section 4(f) impacts associated with the construction or operation of the proposed project.

None of the reasonable alternatives would impact any public lands/parks located within the project study area. Andy Bowie Park is located within the project study area and adjacent to Alternatives 8-11; however, no direct park impacts would occur as a result of the proposed project because the alternatives have been designed to avoid park property.

2.4.2 Social and Economic Impacts

This section describes the anticipated community and social impacts that would be expected to result from the No-Build Alternative and the build alternatives. These impacts include community cohesion, displacements and proximity impacts, such as traffic noise impacts and visual and aesthetic quality. Additional environmental justice impacts are also described. Impacts identified here are generalized and may not be uniform for all residences within a neighborhood or residential area. Impacts may be more pronounced or less pronounced

depending on the proximity of each residence to a proposed alternative.

Each of the alternatives would have some degree of impact on existing neighborhoods and residential areas. In some cases, impacts would include the displacement and required relocation of one or more residences, businesses or facilities in a neighborhood, and in others, proximity of the build alternative may be the only impact. In most cases, however, proximity would result in multiple impacts including increased noise and visual intrusion.

2.4.2.1 Impacts to Neighborhoods and Other Residential Areas

The No-Build Alternative would not have project-related impacts to communities in the study area, but would likely impact some communities by the increase in traffic congestion that is expected to occur on the Queen Isabella Memorial Causeway in the absence of the proposed project.

The City of South Padre Island and the City of Port Isabel would most likely be denied this benefit among communities in the study area as stakeholders from both communities indicate that the communities need to relieve traffic congestion and improve accessibility and mobility to advance their respective goals. Safety considerations related to evacuation routing also necessitates The City of South Padre Island's need, and the No-Build Alternative would deny the City those benefits. There are multiple concerns regarding the safety of having only one vehicular access route to the island. A hurricane bearing toward South Padre Island would require the evacuation of the entire island; and in emergencies, gridlock can occur on the island, as well as on the mainland, when all outbound traffic utilizes one access route and SH 100.

The Town of Bayview, according to its Mayor, would likely benefit from the No-Build Alternative because the proposed reasonable alternatives would not direct additional traffic through the Town and thereby would not jeopardize the rural character of the community, nor would it provide a traffic safety hazard through the community. The Town of Laguna Vista and the community of Laguna Heights would likely be denied some benefit with the No-Build Alternative as commute times on SH 100 and the Queen Isabella Memorial Causeway to job centers in the City of Port Isabel and the City of South Padre Island would continue to climb as a result of increased traffic congestion. Additionally, the Towns of Laguna Vista and South Padre Island would be unable to capitalize on expanding tax revenue generating development to areas where development would be spurred as a result of the proposed 2nd Access Project. Overall and among all communities in the study area, the No-Build Alternative may result in a detriment to air quality and an increase in noise levels.

As a result of the proposed project, some project-related impacts to communities within the study area would likely occur. The Cities of South Padre Island and Port Isabel would both realize improvements to traffic congestion that would improve mobility and accessibility as well as improve safety related to evacuation routing in the event of a hurricane. These improvements would contribute to both communities' specific planning goals. The proposed project would likely contribute to the Town of Laguna Vista's goal to leverage tax revenue by generating development in areas north of the Town where the project would tie into the mainland. As a result of the proposed project, the Town of Bayview could realize increased traffic; thus, conflicting with the Town's goal of preserving its rural character and avoiding potential commercial development that otherwise would not take advantage of heightened land premiums resulting from increased traffic and visibility. The unincorporated community of Laguna Heights may realize some benefit as residents traveling to job centers in both the Cities of Port Isabel and South Padre Island would likely encounter reduced traffic congestion on trips

to work that may effectively reduce commute times and corresponding commuting costs.

Each of the build alternatives would have some degree of adverse impact on existing individual neighborhoods or residential areas. In some cases, impacts include the displacement and required relocation of one or more residences, businesses, or facilities in a neighborhood, and in others, proximity of the build alternative may be the only impact. In most cases, however, proximity would result in multiple impacts including increased noise and visual intrusion.

There are two master planned communities within the project area, The Shores on South Padre Island and the South Padre Island Golf Club/Community on the mainland would be directly impacted by several of the reasonable alternatives. Specifically, Alternatives 8, 9, 10 and 11 would impact The Shores master planned community, and Alternatives 2, 5, 7, 9 and 11 would impact the South Padre Island Golf Club/Community. Alternatives 3 and 6 would not impact The Shores master planned community or the South Padre Island Golf Club/Community.

Direct impacts from Alternatives 8, 9, 10 and 11 to The Shores would include the conversion of approximately 17.75 acres of currently undeveloped residential property to ROW. Direct impacts to The Shores include the loss of 76 platted home sites and associated streets, as well as the loss of the private recreational facility, including the community swimming pool, which has been constructed. *"The Shores Master Plan"* (Franke, Inc.; Realtors 2009) identifies the area that would be converted to ROW as Marina Village II, and states that the area is currently under construction. However, a field visit revealed that there are currently no homes constructed; roads and the private recreational facility are the only components constructed to date. Additionally, the area specified as future construction of the Marina Townhomes would be converted to ROW, as would the southernmost point of Island #1, which is designated as a future phase of The Shores Master Planned Community.

Direct impacts from Alternatives 2, 5, 7, 9 and 11 to the South Padre Island Golf Club/Community would include the conversion of approximately 31.70 acres of currently undeveloped residential property to ROW. The area of the community that would be impacted is at the northernmost reach of Country Club Drive. The *"South Padre Island Golf Community Master Plan"* (Landmark National 2007) does not include a name for this portion of the master planned community.

Proximity Impacts

In addition to impacts associated with the conversion of land to ROW (such as displacements), community impacts would also occur due to proximity to the proposed facility. By considering proximity to the proposed facility, the project team was able to consider the effects - whether real or perceived - associated with nearness to roadway. As a means of quantifying potential proximity impacts, the project team calculated the amount of existing and proposed residential property located outside of, but within 400 feet of, the ROW footprint for each alternative. Alternatives 2, 5, 7, 9, and 11 have the highest potential proximity impacts (ranging from approximately 90.63–128.46 acres within 400 feet of an alternative) to existing and proposed neighborhoods and residential areas. Less than 6 acres of residential property would be located within 400 feet of Alternatives 1, 3, 4 and 6. Approximately 37.98 acres and 43.51 acres of residential property would be located within 400-feet of Alternatives 8 and 10, respectively.

2.4.2.2 Community Cohesion

Under the No-Build Alternative, it is assumed that other planned projects in the study area

would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although these projects would result in community cohesion impacts, the extent of these impacts cannot be determined at this time. Under the No-Build Alternative, there would be no 2nd Access Project-related community cohesion impacts.

If alternative solutions are not developed, the South Padre Island area would continue to experience an overall increase in congestion on the Queen Isabella Memorial Causeway and approaching roadways. The long-term cohesion of the community at large and the interactive linkages between communities, especially between the City of Port Isabel and the City of South Padre Island, may be affected by not building the proposed project. Local communities desire an additional access point to the island in order to encourage more visitors through easier access and positively impact the tourist-driven economy. Study area communities also aspire to improve accessibility to mutually-dependent social, economic, educational, institutional, and cultural activities, services, and facilities. Future neighborhoods or neighborhood expansions would partially continue to develop in accordance with local land use planning policies and zoning requirements. However, the construction of the second access is inherent to the planning and development goals and land use policies of the majority of study area communities and municipalities.

The overall impact of the proposed 2nd Access Project can be expected to have some negative and positive impacts. Because the proposed project involves a tolled bay crossing, some members of the adjacent communities may drive longer distances to utilize the existing non-tolled access route, the Queen Isabella Memorial Causeway, to South Padre Island. While some members of the project area neighborhoods and residential areas may have to travel slightly longer distances to their destinations, the long-term impact of such inconveniences on community cohesion would be minor. Neighborhoods and communities located on both sides of the proposed 2nd Access Project were developed independently of each other. These communities are divided by the presence of the Laguna Madre Bay. The build alternatives would not create a new physical barrier between these communities because members of the communities would utilize existing roadways. In addition, construction of a Build Alternative would not result in the removal or interruption of the existing roadways and would continue to provide access between communities on both sides of the proposed 2nd Access Project.

2.4.2.3 ROW Acquisition and Potential Displacements

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in displacements of residences and businesses, it is not possible to quantify the number, extent or location of displacements until such time as the location and ROW requirements for these projects have been determined. Under the No-Build Alternative, no 2nd Access Project-related displacements would occur.

As of April 2010, Alternatives 2, 5, 7, 9 and 11 would each result in one single-family residential displacement and one commercial building displacement; these two displacements represent the same displacements among each of these five alternatives. In other words, the same single-family residential building and commercial building would be displaced by Alternatives 2, 5, 7, 9 and 11.

Alternatives 1, 4 and 8 would potentially impact, but not displace, the shrimp farm. Alternatives 8, 9, 10 and 11 could potentially impact a private recreational facility at The Shores, but no

residential displacements would be anticipated. Alternatives 1, 3, 4, 6, 8, and 10 would not result in any displacements.

2.4.2.4 Available Housing and Commercial Property in the Area

Within the study area, single-family building has been trending upward, with average value per unit levels exceeding the Cameron County average. High-density and multi-family housing development activity on South Padre Island is a much larger and more prevalent component of its overall housing stock. A number of important large scale projects are under construction including the Sapphire South Padre and The Shores of South Padre Island. In Laguna Vista, the South Padre Island Golf Club/Community's residential sections can accommodate hundreds of new residential units. It is important to note that residential property values and prices on South Padre Island are generally higher than values and prices for residential properties on the mainland where potential displacements are located. A survey of online real estate services for a large portion of the study area revealed an adequate supply of affordable housing available in the study area (as of September 2009). The data suggest that sufficient vacancies exist to accommodate the residential relocation required by the proposed action.

Commercial properties on the mainland are generally concentrated adjacent to SH 100 in the City of Port Isabel and FM 510 in the Town of Laguna Vista. The majority of commercial development within the study area (only 1.1 percent of the total study area) is associated with tourism. While commercial vacancy rates are not available for the area, the availability of undeveloped land that can be utilized for building and development (39.7 percent of the study area) demonstrates the opportunity for displaced businesses to be relocated to new locations in the general area. In addition, improved access and mobility resulting from the proposed action would be an incentive to future development or redevelopment within the project area and beyond. Over the long term, the project area would benefit from the proposed action because of improved access and mobility. Due to the opportunities for business redevelopment and relocation in the area, re-employment opportunities for affected employees would likely occur in the vicinity of their current employment or at other similar business establishments. Assistance would also be available from both the public and private sectors for those who may need new employment. It is important to note that commercial property values and prices on South Padre Island are generally higher than values and prices for commercial properties on the mainland where potential displacements are located.

2.4.2.5 Toll Road Considerations

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT – some of which could be tolled. However, due to the lack of detailed funding plans and other pertinent details, toll-related impacts of these projects cannot currently be assessed. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts associated with tolling.

CCRMA is a newly-established tolling authority with one active toll road (SH 550). The CCRMA is committed to ensuring accessibility to all potential users; thus, policies include prepayment provisions to accommodate those individuals that do not have access to bank accounts, credit card accounts, or credit. The cost to purchase an electronic toll tag but would be comparable to the cost of toll tags in other parts of the state. Policies also establish toll rates applicable to high occupancy vehicles and motorcycles.

2.4.2.6 Impacts to Traffic and Public Safety

By not constructing the proposed 2nd Access Project, dependence upon the existing Queen Isabella Memorial Causeway would continue. Traffic on the existing causeway is projected to increase in the future and a corresponding increase in accidents and other vehicle-related incidents is reasonable to assume. These conditions further compound concerns about dependency on the existing causeway as the single point of access to South Padre Island.

Emergency service vehicles could experience increasing amounts of delay. Having a single point of access from the island restricts traffic flow during emergency evacuations, such as for hurricanes, and limits options for medical transport from the island to hospitals and health care facilities on the mainland. There are multiple concerns regarding the safety of having only one access route to the island. For example, a Category 2 hurricane threatening South Padre Island triggers a mandatory evacuation of the entire island. It is important that evacuation is done without delays or major incidents. During evacuation, gridlock occurs on the island and mainland as all outbound traffic is funneled across the existing causeway and onto SH 100 and other mainland roadways. Each of the reasonable alternatives (with the exception of the No-Build Alternative) would enhance hurricane/emergency evacuation of the island by providing an alternative route between the mainland and the island, and by providing numerous connections between the proposed facility and existing roadways/emergency evacuation routes such as FM 510, FM 2480, FM 106 and General Brant Road. These connections to existing roadways, which would occur between the termini of the proposed project, provide opportunities for evacuating traffic to exit the proposed facility and utilize the broader roadway network to reach evacuation destinations (rather than forcing all evacuating traffic through Port Isabel and existing bottlenecks within the city). All traffic evacuating the island would not be required to travel through a single point, as is the case today.

The proposed action would have an overall beneficial impact on the level of public safety in the study area. This improvement in public safety would be attributable to the diversion from the causeway of motorists who would use the proposed 2nd Access Project because of greater convenience and faster travel time. Similarly, any reduction in peak, weekday, weekend, and holiday local and non-local auto traffic on existing area roads would have beneficial public safety implications for the local area. Management of congestion on local roads could facilitate a reduction in response time for police, fire protection, and medical services.

Traffic demand is found to be the highest during the summer months and peaks during the spring break period. At such times, it can take several hours to cross the Queen Isabella Memorial Causeway. Congestion during these times can be exacerbated by traffic accidents on the bridge or other incidents that could result in the incapacitation of the Causeway.

The limited access restricts traffic flow during emergency evacuations, limits the economic development potential of the area and contributes to elevated congestion levels and decreased mobility. The effects of these issues will be further compounded as the population of the island and the adjacent areas increase in the future. A second bridge to the island would allow for an alternate route to be taken. The proposed second access would provide for faster access to hospitals, doctors, and other emergency personnel, especially during times of high traffic.

2.4.2.7 Impacts to Travel Patterns and Accessibility

Travel patterns within the project area would remain largely unchanged if the proposed action is not constructed. This would result in a continuation of travel delays and access constraints that currently characterize the project area. Under the No-Build Alternative, the insufficient

transportation network within the project area would continue to pose mobility and access constraints; although, other projects of CCRMA, TxDOT and other entities would be constructed in the study area. The adverse effect of impaired mobility in the project area would continue to be felt mainly by residents, commercial establishments, and other interests in the form of increased commute time and other costs of congestion. The lack of accessibility negatively affects interests located for the most part outside of the study area. Additionally, the No-Build Alternative fails to address congestion and safety concerns.

The build alternatives offer improvements to travel patterns and accessibility within the study area to a large extent. As an alternate route to the Queen Isabella Memorial Causeway, the proposed 2nd Access Project would present an alternate option for accessing South Padre Island. Access to the island would be improved by all of the build alternatives. Many of the vehicle trips bound for South Padre Island that currently rely on the Queen Isabella Memorial Causeway would have a convenient alternative in the proposed 2nd Access Project, especially those trips that originate from the City of Harlingen and the towns or communities located to the north. Additionally, an alternative ingress and egress from the island would improve overall traffic circulation on the island and the mainland.

Each of the build alternatives utilizes existing roadways. The design provides for uninterrupted service on existing roadways. Finally, the proposed 2nd Access Project would improve access for emergency vehicles responding to calls within the study area as well as improved access for emergency evacuations, such as hurricane evacuations.

2.4.2.8 Limited English Proficiency Considerations

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would impact individuals with Limited English Proficiency, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts on individuals with Limited English Proficiency.

The percentages of residents within the project area census block groups who speak English "not well" or "not at all" range from 2.8 percent to 33.6 percent. Limited English Proficiency persons were identified within the census block groups in the project area. Alternatives 1-11 would all potentially impact four census block groups, and Alternatives 2, 5, 7, 9 and 11 would impact the same four block groups as well as one additional block group. According to *Census 2000* data, of the residents who speak English "not well" or "not at all" located in the project area, the predominant language spoken is Spanish.

Efforts have been made to include all affected communities and populations, including potential minority and low-income populations, in the public involvement and decision making process. Public outreach efforts have included public scoping meetings, technical working group meetings, community workshops, and meetings with elected officials. Future public outreach activities will include continued technical working group meetings and meetings with elected officials. A proactive public involvement program will continue for the proposed project and all populations affected will have a continuing opportunity to participate in the development of the project. Interpreters were present at the public scoping meetings and all project materials were available in Spanish. Spanish translation and interpretation will be available at the public hearings and will continue to be utilized in future meetings with Limited English Proficiency

communities.

2.4.2.9 Impacts to Social Groups: Environmental Justice Considerations

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would impact Environmental Justice populations, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, current travel patterns to/from the island would remain unchanged; the environmental justice population (as well as the general population) would continue to use the existing causeway to access South Padre Island. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts on environmental justice populations.

The proposed 2nd Access Project would not result in disproportionate impacts on minority and low-income populations within the project area due to the existence of a non-toll alternative route (Queen Isabella Memorial Causeway), enhanced safety and mobility, support of economic development, environmental sensitivity and the creation of an alternate evacuation route from South Padre Island. The proposed action is similarly consistent with Title VI in that there is no evidence of discriminatory intent or effect. The proposed action offers the possibility of long-term benefits to these areas and their residents without resulting in disproportionately high or adverse impacts. The proposed 2nd Access Project would therefore be consistent with the policy established in Executive Order 12898 and FHWA Order 6640.23.

2.4.2.10 Impacts to Community or Public Resources

The No-Build Alternative would adversely impact community and public resources within the proposed 2nd Access Project study area. The adverse impacts would be realized in the form of increased congestion, extended travel times and reduced mobility. The adverse travel effects could in turn impact tourism, emergency services, recreational facilities, and businesses as well as mobility and access within the study area.

Impacts to community and public resources may occur as a result of the proposed action. These impacts may include proximity impacts, such as traffic noise impacts, visual intrusion, or increased traffic on local arterials. Impacts may be more pronounced or less pronounced depending on the proximity of each resource to a proposed alternative. Although noise levels are expected to increase near all resources that are adjacent, or in close proximity to one of the build alternatives, none of the identified community or public resources would be impacted by noise.

The impacts to community and public resources range from proximity impacts such as visual intrusion to increased traffic on adjacent streets. No schools, places of worship or community facilities would be relocated, or directly impacted, as a result of the proposed 2nd Access Project, as most of these facilities are located in the City of Port Isabel.

2.4.2.11 Economic Impacts

The No-Build Alternative would not result in economic impacts associated with the construction or operation of the proposed project.

The proposed 2nd Access Project has been developed with continuous direct input from local

government officials, representatives from the business community, as well as local residents. Throughout the project development process, it has been recognized that the proposed 2nd Access Project would improve the local economy by encouraging economic development. The proposed 2nd Access Project build alternatives would stimulate the project area and region with improved access and visibility, creating new opportunities for development, jobs, and revenue to local tax bases.

Overall, the proposed project would result in positive economic impacts. Reduced congestion would help to accommodate additional visitors to the island who might be otherwise discouraged by traffic. Ease of access to the island would promote increased tourism, encourage more year-round residents to move to the island, and increase demand for goods and services as a result of increased tourism and increased residents. Additionally, construction of the proposed 2nd Access Project would have temporary economic benefits such as increased local employment during construction and economic benefit to local businesses utilized by construction-related personnel during construction.

2.4.2.12 Summary of Impacts to Community Conditions

Town of Bayview

According to the Town of Bayview's Mayor, current traffic levels in the community already threaten the Town's goals of preserving itself as a quiet, rural residential community. The majority of Town of Bayview residents, according to the Mayor, also oppose commercial development within the community, including land along FM 510 through the Town. The Mayor states that the proposed connection of the 2nd Access to FM 510 would dramatically increase traffic flow through the community, and as a result, stimulate pressure for commercial development within the community as land values increase as a result of increases in visibility and access. According to the Mayor, the increase in traffic flow would also jeopardize the rural and tranquil integrity of the community and work against its goals of preserving its serenity.

City of Port Isabel

According to the City of Port Isabel's City Manager, the lessening of congestion along SH 100 and the Queen Isabella Causeway as a result of a second access between the mainland and South Padre Island would allow the City of Port Isabel to become more of a unique destination community, which is ultimately the City's goal. Currently, congestion along SH 100 and the Queen Isabella Causeway impedes the City of Port Isabel's ability to capture its potential of tourism revenue, especially from those wishing to specifically take advantage of the City of Port Isabel's historic, ecological, recreational, and cultural amenities. The City of Port Isabel's City Manager also stated that Port Isabel is currently a retail destination for many residents of South Padre Island, as many Island residents travel to the City of Port Isabel for basic needs such as groceries and general merchandise items. With less congestion, the City of Port Isabel's retail establishments would realize greater market capture because there would be less of an obstacle related to traffic congestion for Island residents to travel to the City. Therefore, the 2nd Access Project is anticipated to assist the City of Port Isabel in reaching its goals.

Town of Laguna Vista

According to the Town of Laguna Vista's City Manager, the Town is currently in the process of transitioning from a general-law municipality to a home-rule municipality as designated in the Texas Local Government Code, which would ultimately give the Town more authority to control its boundaries, annex additional land area, implement community plans, enforce ordinances, and regulate land uses. In doing so, the Town of Laguna Vista plans to annex land north of its current municipal boundaries to encompass the area traversed by the proposed reasonable

alternatives where they would tie into the mainland from crossing the Laguna Madre from South Padre Island. The plan to annex this land that would likely increase in value and development pressure would allow the Town of Laguna Vista to support additional development and expand its tax revenue to better serve Town residents and provide them additional community amenities. The proposed 2nd Access Project would allow the Town of Laguna Vista to advance this prominent goal and capitalize on such impacts.

City of South Padre Island

The proposed 2nd Access Project is integral to the City of South Padre Island's planning and development goals. The proposed project would allow the City of South Padre Island to attract additional year-round residents and tourists by improving mobility, increasing accessibility, and lessening congestion on the island and between the island and mainland. Such an enhancement working in conjunction with the City of South Padre Island's goal of annexing land north of the Town in unincorporated Cameron County would provide an opportunity for the Town to develop and support additional housing opportunities for year-round residents as well as tourist amenities to attract additional visitors. The 2nd Access Project would also contribute to providing a friendlier environment for residents, tourists, and businesses, allowing them improved access and mobility but also providing improved evacuation capacity from the island when warranted.

Laguna Heights

Because none of the 11 reasonable alternatives traverse the boundaries of the Laguna Heights census-designated place, the proposed 2nd Access Project is unlikely to have any substantial impact on the Laguna Heights community. An additional access bridge to South Padre Island would provide workers who live in Laguna Heights an alternative option for traveling to work on the island, and because the proposed 2nd Access to South Padre Island would likely shift some regional traffic away from using the Queen Isabella Causeway to the proposed facility, commute times may be reduced for those workers using the Queen Isabella Causeway with the anticipated overall improved mobility and accessibility and lessened congestion. It is unlikely, however, that many workers living in Laguna Heights and commuting to South Padre Island would use the proposed 2nd Access as a primary means to travel to work because the alternative alignments would require commutes of longer distances from Laguna Heights to the island.

2.4.3 Traffic Noise

The No-Build Alternative would not result in traffic noise impacts to humans associated with the construction or operation of the proposed project.

Predicted traffic noise levels were modeled at receiver locations that represent the land use activity areas adjacent to the 11 reasonable alternatives that might be impacted by traffic noise and potentially benefit from feasible and reasonable noise abatement. None of the reasonable alternatives of the proposed 2nd Access Project would result in traffic noise impacts to humans.

2.4.4 Climate and Air Quality

The No-Build Alternative would not conform to local transportation plans and programs. This alternative would be inconsistent with the *2007–2011 Cameron County Regional Mobility Authority Strategic Plan* (CCRMA 2006), which contains specific projects, programs, and policies intended to provide congestion relief, traffic safety, and enhance mobility in the rapidly growing Rio Grande Valley area. The No-Build Alternative would not meet the need to facilitate congestion management during peak travel periods and emergency evacuations.

The proposed 2nd Access Project is located in Cameron County which is in attainment of all National Ambient Air Quality Standards (NAAQS); therefore, the transportation conformity rule does not apply. The proposed project is not located within an urbanized area or within the boundaries of a Metropolitan Planning Organization area; therefore, it is not included in a Metropolitan Transportation Plan. Because the project is currently unfunded and planned for letting beyond the current Statewide Transportation Improvement Program timeframe, the project is not currently included in the *FY 2011-2014 Statewide Transportation Improvement Program*.

However, the project is included in and consistent with the *2007–2011 Cameron County Regional Mobility Authority Strategic Plan* (CCRMA 2006). Refer to **Appendix C** for the *2007–2011 Cameron County Regional Mobility Authority Strategic Plan* page pertinent to the proposed project. In accordance with 40 Code of Federal Regulations (CFR) 93.114, FHWA will not take final action on this environmental document until the proposed project is consistent with a current Statewide Transportation Improvement Program.

Traffic data for the build alternatives design year (2036) is projected to be 28,550 vehicles per day. A prior TxDOT modeling study demonstrated that it is unlikely that a carbon monoxide standard would ever be exceeded as a result of any project with an average daily traffic below 140,000 vehicles per day. The average daily traffic projections for the build alternatives of the project would not exceed 140,000 vehicles per day; therefore, a Traffic Air Quality Analysis is not required.

Construction would not begin until after receipt of the record of decision. Once initiated it is anticipated that construction would take three years to complete. The current estimated date of completion is 2015. The ROW, utility and mitigation costs are all site specific and cannot be accurately estimated at this time. Construction costs are estimated between $406-482 million, depending on the alternative.
The pollutants with most potential to increase due to transportation and construction activities include ozone, carbon monoxide, particulate matter and MSATs.

2.4.5 Geology and Soils

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. It is not possible to accurately assess the extent of geology and soil impacts that would result from these projects because route location and ROW requirements have not yet been established. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts on geology and soils.

All build alternatives would traverse similar topography, soils and geologic features consisting of Beaumont Formation of Pleistocene age and the overlying sediments of Holocene age. Out of the six types of geological features within the study area, only four would potentially be impacted by the reasonable alternatives.

2.4.6 Energy Impacts

The No-Build Alternative would not result in energy impacts associated with the construction or operation of the proposed project.

All build alternatives would require short-term energy consumption during construction activity. Construction-related energy consumption would be generally based on the construction cost of

the alternative. The amount of energy required for the production and placement of materials (asphalt, structures, cut, fill, etc.) during construction would be a fixed one-time cost. Construction-related energy consumption would be short-term in nature and could be offset by operational energy efficiencies gained through the use of an improved transportation facility over many decades. Energy impacts are a function of several variables including average running speed, vehicle-miles of travel and the mix of vehicle types in the system.

The designation of the proposed 2nd Access Project as a toll road is not expected to result in an adverse impact to energy resources. The proposed 2nd Access Project is expected to be an electronic toll collection facility. An electronic toll collection system provides operational efficiencies and would help reduce the stop-and-go conditions that are associated with conventional cash booths at toll plazas, resulting in lower consumption of energy resources. The toll designation would allow the roadway to be built sooner than with traditional funding; therefore, network construction would occur sooner. This would result in energy consumption reductions.

2.4.7 Prime Farmland Soils

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would impact prime farmland soils, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined.

Prime farmland soils would be avoided, where practicable; however, each alternative would have an unavoidable effect on some prime farmland soils. The Natural Resources Conservation Service (NRCS) CPA-106 was used to determine project-related impacts to farmlands in the study area. Farmland scoring on Form CPA-106 is based on a possible 260 points. Those alternatives (sites) receiving scores totaling less than 160 points are given a minimal level of consideration for protection. Alternatives 1–11 received scores between 26 and 52 points, below the criteria requiring further coordination with the NRCS. CPA-106 Farmland scoring forms are found in **Appendix F**.

2.4.8 Water Resources

2.4.8.1 Surface Water

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would impact water resources, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to surface water.

Surface waters within the reasonable alternatives can be affected in numerous ways by the operations of a highway. Short-term impacts to surface water quality from the land based alternatives would arise during construction activities. During construction, spills would be mainly limited to fuels (i.e., petrochemicals) and lubricants used for construction equipment. Short-term impacts to the Laguna Madre from the water crossing alternatives would also include potential spills from construction equipment and sedimentation from the installation of the

causeway support structures.

2.4.8.2 Floodplains

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would impact water resources, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined.

Under the No-Build Alternative, there would be no 2nd Access Project-related floodplain impacts. All build alternatives would encroach upon the 100-year floodplain of the Laguna Madre and Gulf of Mexico. Impacts to the 100-year floodplain would vary from approximately 162.86 acres as a result of Alternative 10 to approximately 359.25 acres as a result of Alternative 2.

2.4.8.3 Groundwater

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would impact water resources, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to groundwater.

Construction, operation and maintenance of the proposed 2nd Access Project are not anticipated to adversely affect groundwater. There are no documented plumes of contaminated shallow groundwater within the project area, but no detailed groundwater analyses have been conducted. The study area does not occur over any major or minor freshwater aquifers; therefore, the project would not have any potential impacts to any aquifer resources. Adverse impacts to groundwater could occur because of a potential spill of hazardous or toxic material during transport on the completed facility.

Public Drinking Water Systems

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would impact water resources, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to public drinking water systems.

The proposed project may increase infiltration rates and potentially increase pollution from the roadway runoff; however, it is anticipated to minimal. The proposed project is not anticipated to result in any effects to public drinking water systems. Potential impacts to public water supply wells were assessed using data gathered from the Texas Commission on Environmental Quality (TCEQ) and Texas Water Development Board databases. Well records indicated that eight public water supply wells are located within the study area, but none of the reasonable alternatives cross or would displace any of these wells. The proposed project is also not anticipated to alter recharge zones of the water supply wells or alter drinking water quality.

2.4.8.4 Wetlands and Other Waters of the U.S. Impacts

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in impacts to wetlands and other waters of the U.S., it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to wetlands and other waters of the U.S.

Potential wetlands and other waters of the U.S. occur in various sizes within the proposed 2nd Access Project study area. Most obvious features are associated with the Laguna Madre. All 11 build alternatives would potentially result in impacts to wetlands. Potential impacts range from a minimum of 129.81 acres (Alternative 10) to a maximum of 243.68 acres (Alternative 9). Alternative 6 would impact 139.14 acres of wetlands. Because the location of staging areas, borrow areas, placement areas, and other Project Specific Locations will be determined by the contractor, the contractor would be responsible for any required permitting.

Permits

Section 404 of the Clean Water Act, which is administered and enforced by the USACE and EPA, requires a permit in order to discharge dredged or fill material into waters of the U.S., including wetlands. For impact greater than one-half acre (non-tidal) or one-third (tidal), the placement of temporary or permanent fill material into jurisdictional Waters of the U.S. would require authorization by a Section 404 Individual Permit.

Based on the preliminary assessment of wetland impacts, all 11 build alternatives would require a USACE permit under Section 404 and compensatory mitigation for unavoidable impacts. It is anticipated that a combination of individual and nationwide permits would be required. This project involves work in or over a navigable water of the U.S. under Section 10 of the Rivers and Harbors Act. The USACE permit application would be requested under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899.

Following approval of the draft environmental impact statement and the public hearing, the final environmental impact statement and permitting process would begin. The recommended preferred alternative would be delineated for wetlands and other waters of the U.S. and the appropriate permit would be prepared and submitted to the USACE. The permit application would include a description of all proposed impacts to wetlands and waters of the U.S. within the proposed ROW and a proposed mitigation plan. The proposed project would affect more than 3 acres of waters of the U.S.; therefore, a TCEQ Tier II Section 401 Certification Questionnaire and Alternative Analysis Checklist would be required. A TCEQ Texas Pollution Discharge Elimination System (CWA Section 402) Construction General Permit would also be required.

The location of staging areas, borrow areas, placement areas, and other Project Specific Locations will be determined by the contractor; therefore, the contractor would be responsible for any required permitting and additional mitigation required for those areas.

Coastal Zone Management

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects

would occur within the coastal zone management area and coordination with the Coastal Coordination Council would be required, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related coastal zone impacts.

The Coastal Coordination Council is the agency responsible for planning and regulation of land and water uses in the Texas Coastal Zone, consistent with the Coastal Management Plan. Texas Administrative Code, Title 31, Part 16, Chapter 501, Subchapter B Rule Section 501.12). Because the proposed project occurs within the coastal zone management area, coordination with the Coastal Coordination Council would be required.

A Federal Consistency Review would be conducted by the Texas General Land Office on behalf of the Coastal Coordination Council when construction occurs within the Texas Coastal Zone Boundary. The Texas General Land Office would review project plans to ensure that they meet the goals and policies of the Coastal Management Program to the maximum extent practicable. Project plans are submitted to the Texas General Land Office from the USACE.

2.4.9 Ecological

2.4.9.1 Vegetation

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in impacts to vegetation, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to vegetation.

The primary impact to vegetation resulting from site preparation and construction of the proposed project is the removal of existing vegetation from the ROW and any construction staging areas. The build alternatives would potentially impact nine general vegetation community types: light brush, dense brush, rangeland, farmland, riparian, fence line, dune, seagrass and landscape. Two rare vegetation communities were also identified. Although each of these communities would be potentially impacted, only wetlands (including adjacent freshwater wetlands, estuarine and tidal wetlands, tidal flats and all permanently inundated waters in the Laguna Madre), dunes, brush and farmland within the community types are regulated by state and federal resource agencies.

Rangeland is the dominant vegetation type within the project area. Alternative 5 would have the highest impact (approximately 215.58 acres) and Alternative 8 would have the least impact (approximately 112.18 acres).

Direct impacts to seagrass beds would entail the alteration of disturbance of seagrass, sediments, and exposure to tides and currents along the edge of the disturbed seagrass community. Direct impacts to the seagrasses would include the removal of plants during construction, and increased suspended sediments due to sediment disturbing activities. Alternatives 8 and 9 would have the highest impact (approximately 47.94 acres) and Alternative 3 would have the least impact (approximately 21.40 acres). Alternative 6 would impact 40.45 acres of seagrass beds.

2.4.9.2 Wildlife

Terrestrial Wildlife

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in impacts to terrestrial wildlife, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to wildlife.

The primary impacts from the project to wildlife species inhabiting the project area are loss of habitat and habitat fragmentation. Alternative 8 would result in the least amount of acreage impacts (187.63 acres) to wildlife habitat (brush, fence line, riparian and dune vegetation, rangeland and seagrasses) resulting in the least amount of adverse impacts to wildlife. Alternative 6 would result in the largest amount of impacts (360.57 acres) to wildlife habitat.

Colonial Waterbird Rookeries

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in impacts to colonial waterbird rookeries, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to colonial waterbird rookeries.

Dredged spoil sites related to the construction and maintenance of the Gulf Intracoastal Waterway provide artificial nesting habitats for colonial waterbirds. Three of these sites (Laguna Vista Spoil, Port Isabel Spoil and Three Island Spoil) have been identified in the study area by the Texas General Land Office as containing active colonial waterbird rookeries (**Exhibit 5-2b)**. None of these spoil sites would be impacted by construction of any of the build alternatives; therefore, no impacts to colonial waterbird rookeries would occur as a result of the proposed project.

Migratory Bird Treaty Act

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in impacts to migratory birds, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to migratory birds.

South Padre Island is an important migratory bird fallout area for trans-gulf migratory birds from southern Mexico and Central America. The island is the first landfall for these neotropical and nearctic birds and provides critical resting and feeding habitats. The dense brushland and rangeland provide nesting habitat for migratory birds. The area is important wintering habitat for shorebirds and waterfowl; 80 percent of the continental red-headed duck population winters on the Laguna Madre. Cordgrass habitat provides crucial habitat for mottled ducks, which have been declining in Texas for several decades. Tidal flats provide important nesting habitat for five species of ground-nesting shorebirds, including two plover species, black-necked stilt, and

American avocet. The LANWR has the highest number (21 percent) of shorebirds found along the Texas Coast, and is an officially-designated Western Hemisphere Shorebird Reserve Network site. The importance of migratory birds is also indicated by the location of the South Padre Island World Birding and Nature Center immediately south of the proposed project.

To avoid impacts to migratory birds, active breeding areas would be avoided during construction of the proposed project.

Essential Fish Habitat

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in impacts to essential fish habitat, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to essential fish habitat.

The Laguna Madre supports extremely valuable commercial and recreational fisheries. Potential impacts to essential fish habitat from activities associated with the construction, operation, and maintenance of the proposed project may result from temporary degradation of water quality (sedimentation and turbidity) as well as direct impact from the installation of bridge supports and their foundations on the seafloor (loss of sandy bottom and seagrass habitat and the creation of water column structures). Other impacts that may result from the construction of the proposed project include effects from noise, mortality and displacement of fish and benthic organisms. Long-term effects from the bridge structure could include permanent alteration of the light and current/sedimentation regimes in the vicinity of the bridge, with potential localized effects to seagrass beds, in turn affecting essential fish habitat quality. Bridge piers could serve as attachment sites for some marine organisms, potentially serving as an attractant to reef fish species.

2.4.9.3 Threatened and Endangered Species

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in impacts to threatened and endangered species, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to threatened and endangered species.

Threatened, endangered, and sensitive species associated with the Texas Gulf Coast area include marine and estuarine species such as the sea turtle (3 federally endangered and 2 federally threatened) and terrestrial species such as the federally endangered ocelot and Northern Aplomado Falcon and federally threatened Piping Plover. In addition, several rare and endangered plants such as Vasey's adelia (rare), star cactus (state endangered), Texas ayenia (federally endangered), Runyon's cory cactus (rare), Green Island echeandia (rare), Runyon's water-willow (rare) and Shinner's rocket (rare) are found nowhere else except the South Texas Gulf Coast and Lower Rio Grande Valley area.

A check of the TPWD's "mimic" version of the Texas Natural Diversity Database was obtained on August 11, 2009 and on October 8, 2010. The Texas Natural Diversity Database did show

occurrences for four federally-listed species (ocelot, jaguarundi, Piping Plover, green sea turtle) and seven state-listed species (Bailey's ballmoss, Lila de los llanos, sheep frog, black-spotted newt, south Texas siren, Mexican treefrog, peregrine falcon) within the study area, as well as occurrences of approximately 50 federal and state-listed species that have been documented within the vicinity of the study area.

The Texas Natural Diversity Database lists known occurrences of the jaguarundi within the study area (EO ID 8139) and 6.3 miles west (EO ID 2415) of the study area. In addition, the jaguarundi has been known to inhabit the LANWR. The most recent confirmed jaguarundi sightings were in 2004. An unconfirmed sighting was reported in January 2005. The jaguarundi uses dense brush habitats very similar to those of the ocelot. Dense brush is considered prime jaguarundi habitat and light brush is considered marginal jaguarundi habitat. Alternatives 6 and 10 have the largest amount of impact (107.82 acres) and Alternatives 2, 5 and 9 would have the least amount of impact (4.79 acres). The proposed project may affect and is likely to adversely affect the jaguarundi.

There are 13 confirmed resident ocelots at the LANWR. In addition, there are six known occurrences of the ocelot within the study area reported by the TPWD Natural Diversity Database. In addition, numerous ocelot travel corridors have been identified in the study area; therefore, the proposed project is likely to adversely affect the ocelot. According to the USFWS, ocelots were, within recent history, able to move throughout the local landscape and interbreeding occurred between the U.S. and Mexican ocelot populations. Development of the Lower Rio Grande Valley has caused extensive habitat loss and fragmentation. Moreover, vehicle strikes have been the main mortality factor for ocelots in Texas. To address these concerns, project planning would include habitat impact minimization, mitigation to preserve intact habitat (thorn-scrub, coastal grasslands), and effective wildlife crossings. The type and location of wildlife crossings would be determined in cooperation with the USFWS. These crossings would serve to enhance mobility of ocelots while mitigating loss of connectivity between habitat patches.

Potential ocelot habitat has been calculated by combining the acreage amounts of light brush and dense brush vegetation communities. Dense brush is considered prime ocelot habitat and light brush is considered marginal ocelot habitat. Alternative 10 has the largest amount of impact (107.82 acres) and Alternatives 2, 5 and 9 would have the least amount of impact (4.79 acres). Alternative 6 would impact 107.82 acres of dense and light brush.

A biological assessment has been prepared in anticipation of formal consultation with USFWS under Section 7 of the Endangered Species Act.

Marine Mammal Protection Act

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in impacts to marine mammals, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to marine mammals.

The "incidental take" of other marine mammals, such as the bottlenose dolphin, may also occur as a result of the proposed project due to acoustical impacts associated with the operation of construction equipment (e.g. pile driving) in the Laguna Madre. Pile driving would potentially

result in Level B Harassment of marine mammals. Level B Harassment means the activity has the potential to disturb a marine mammal or marine mammal stock in the wild by disrupting behavioral patterns, but which does not have the potential to injure a marine mammal or marine mammal stock in the wild.

Coordination with the National Oceanic and Atmospheric Administration (NOAA) Fisheries would be conducted to determine if the proposed project has the potential to result in incidental take of marine mammal species. If NOAA Fisheries determine that incidental take would occur, a request for an Incidental Harassment Authorization would be prepared and submitted to NOAA Fisheries.

2.4.10 Cultural Resources

2.4.10.1 Archeological Resources

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is possible that at least some of these projects would impact archeological resources, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts on archeological resources.

In addition to the identification of known archeological resources within or near the build alternatives, areas of low probability for containing intact archeological deposits were identified within the study area. Areas where the preservation of intact archeological deposits is considered unlikely were identified as low probability areas. These areas were selected based on the prevalence of disturbances, proximity/distance of previously recorded archaeological sites, soils, topography, and the general character of the landscape. There are two archeological sites and four shipwrecks within 1 mile of the build alternatives. There are no known archeological sites or shipwrecks within the proposed ROW of any of the alternatives. Each of reasonable alternatives contains various lengths of delineated areas of low probability ranging from 8.61 miles (Alternative 4) to 0.37 mile (Alternatives 9 and 11).

2.4.10.2 Non-Archeological Historic Resources

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is possible that at least some of these projects would impact historic resources, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts on historic resources.

Within the Survey Area there is one National Register of Historic Places (NRHP) listed property (the Port Isabel Lighthouse) and one NRHP-eligible property (the 1936 Centennial Marker for the Old Point Isabel Lighthouse). Within the area of potential effects of the reasonable alternatives, there are 21 historic-age non-archeological resources on seven properties that were identified and evaluated for NRHP eligibility. None of the 21 historic-age resources identified within the area of potential effect were recommended eligible for inclusion in the NRHP. Because the properties are recommended not eligible, the project would have no effect to non-archeological historic resources. Because this project is a major federal action,

individual project coordination with the State Historic Preservation Officer is required.

2.4.11 Hazardous Materials Sites

Hazardous materials sites do exist within the study area; however, the No-Build Alternative would not result in hazardous materials impacts associated with the construction or operation of the proposed project.

As a result of the regulatory database search, no documented federal or state regulated hazardous materials sites were identified within the American Society for Testing and Materials 1527-05 search distances of any of the build alternatives (Banks 2010). There is a minor risk that non-documented hazardous materials sites could be located within the project area.

Within the study area, 56 well cluster sites, including 25 gas wells, were found and may pose a hazardous materials risk to the proposed project. There were a total of seven wells identified in the 0.25 mile search radius of the build alternatives (Banks 2010). These included two plugged gas wells, two sidetrack wells (wells that are drilled vertically and then pumped horizontally), two dry holes (nonproducing wells), and one permitted location. One well, listed as a sidetrack well surface location, is located within the proposed ROW of Alternative 3 and poses a moderate risk to the project. The other six wells are within 0.25 mile of Alternatives 1, 2, 3, 4, 5, 6, 7, 8, and 10 proposed ROWs. These wells pose a low risk to highway construction. It is recommended that further investigation of each of these seven sites be conducted prior to construction. The remaining sites identified in the oil and gas well search are located at a distance from the build alternatives and should not pose a risk to construction activities associated with any of the build alternatives.

Alternative 9 is the only proposed build alternative with no gas wells within 0.25 mile of the proposed ROW. There were no oil wells, producing or otherwise, identified within the study area search radius.

2.4.12 Visual and Aesthetic Quality

The No-Build Alternative would not result in visual and aesthetic quality impacts associated with the construction or operation of the proposed project.

The visual impact of the proposed 2nd Access Project was assessed and rated according to the level of the roadway's visual impact (low, moderate, moderately high and high). The visual impacts of project alternatives are determined by assessing the visual resource change due to the project and predicting viewer response to that change. Visual resource change is the sum of the change in visual character and change in visual quality. Visual impact levels of the alternatives ranged from low to moderately high.

2.4.13 Airports

The No-Build Alternative would not result in airport impacts associated with the construction or operation of the proposed project.

The Port Isabel Cameron County Airport is located approximately 1,500 feet from Alternatives 1, 4 or 8. Filing of FAA Form 7460-1 would be required. Form 7460-1 would be completed by TxDOT prior to construction of the proposed project. The airport would then issue a Notice to Airmen once construction begins. No additional ROW would be required from the airport property and therefore, no direct impacts to the airport are anticipated.

2.4.14 Navigation

The No-Build Alternative would not result in navigational impacts associated with the construction or operation of the proposed project.

The proposed project would be designed to meet or exceed minimum horizontal and vertical clearance requirements as well as any other design criteria governing construction of structures over the Gulf Intracoastal Waterway; thus, no permanent impacts to navigation would be expected as a result of the proposed project. Construction activities would be planned and sequenced in a manner that would minimize disruption of traffic (including recreational boating) on the Gulf Intracoastal Waterway; thus, minimizing the potential for disruption to navigation during the construction phase.

The existing Queen Isabella Memorial Causeway is currently the only structure spanning the Gulf Intracoastal Waterway in the project area. The existing causeway has a vertical clearance of 73-feet above the mean high tide and a horizontal clearance of 275-feet (between fenders). The proposed bridge structure would be required to at least meet these requirements.

A navigation hazard risk assessment would be performed during the design phase when specific details regarding bridge length, height, and vertical/horizontal clearances are known. The U.S. Coast Guard (USCG) would be consulted during the risk assessment process.

2.4.15 Construction Phase Impacts

The No-Build Alternative would not result in impacts associated with the construction or operation of the proposed project.

Construction of the build alternative would occur with a defined sequence of work. Traffic control plans would be used to identify traffic detours/re-routing/road-intersection closures. Road user costs would be considered in the traffic control planning to ensure that construction activities that create high road user costs are carefully planned and completed rapidly. The construction contract specifications would address advanced notification to the public for implementation of traffic control for specific project sequences. Construction contract financial incentives could be used, if appropriate, to specifically identify timely completion milestones in order to limit and minimize the effects of the project construction phases on the public user and the environment.

2.4.16 Relationship of Local Short-Term Uses Versus Long-Term Productivity

The No-Build Alternative would not result in local short-term use impacts or long-term productivity impacts associated with the construction or operation of the proposed project.

Construction of the proposed 2nd Access Project would cause limited short-term adverse effects on the environment. The short-term uses of the environment associated with the proposed reasonable alternatives are anticipated to be similar for each build alternative and are typical of those associated with highway construction. These short-term environmental concerns include construction-related noise, air quality impacts and water quality impacts. In comparison to these short-term impacts, the most evident long-term benefit of the proposed alternative alignments is the improved local and regional connectivity and improved emergency evacuation. In addition, long-term economic benefits would result from the construction of the proposed project. Mitigation for adverse short-term and long-term construction impacts would be included in the project design.

2.4.17 Irreversible and Irretrievable Commitments of Resources

The No-Build Alternative would not result in irreversible and irretrievable commitment of resource impacts associated with the construction or operation of the proposed project.

Construction of the proposed 2nd Access Project would involve an irreversible and irretrievable commitment of resources. The commitment of land required for the proposed ROW would vary in size depending on which of the alternatives is constructed. This land includes residential and business properties, farmland, natural landscapes and wildlife habitat. Land occupied by the proposed project would be considered an irreversible commitment during the period that the land is used for a transportation facility. However, if a greater need arises for use of the land, or if the transportation facility is no longer needed, the land could be converted to another use. The natural resources required for construction includes aggregate, cement, asphalt, sand and iron ore for steel products. Once used for construction, these resources cannot be replaced as natural resources. They are not in short supply, and their use would not have an adverse effect upon the continued availability of these resources. Construction would also require an expenditure of fossil fuel. The commitment of these resources is based on the concept that residents in the immediate area and region would benefit by the improved quality of the transportation system, project economic benefits, and improved hurricane evacuation.

2.4.18 Indirect Effects

Indirect effects, as defined by Council on Environmental Quality's (CEQ's) regulations, are "caused by the proposed action and occur later in time or farther removed in distance, 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" (40 Code of Federal Regulations [CFR] 1508.8). Indirect effects differ from direct impacts associated with the construction and operation of the proposed project and are caused by an action or actions that have an established relationship or connection to the proposed project. However, indirect effects can be linked to direct effects in a causal chain, which can be extended as indirect effects produce further consequences (National Cooperative Highway Research Program 2002).

Indirect effects often occur outside of the project ROW, and may include growth-inducing effects on air, water, and other natural resources. Examples of potential indirect effects of transportation projects may include the following:

- Development and land use changes due to improved access;
- Storm water runoff increases due to changes in land use and increased development on land surrounding a proposed roadway facility;
- Increased sedimentation of wetlands and streams and decreased water quality due to future development of land adjacent to a new facility;
- Loss of vegetation, wildlife habitat, and habitat connectivity, and decreased habitat value in areas of increased land development caused indirectly by improved access;
- Impact to historic or archaeological resource sites from development projects on private property that do not require cultural resource investigation because public funds or permits are not required;
- Increased use of parks and recreational areas due to more convenient access provided by a new facility;
- Stimulation of the local economy from the circulation of construction spending;

- Improved access to employment opportunities, markets, goods or services such as health and education; and
- An increased work force related to construction and developments stemming from a new facility.

Indirect effects are commonly related to changes in land use resulting from induced development. Changes in travel patterns may occur in conjunction with transportation projects, including those where tolling is involved. When a transportation project is constructed, increased access (direct effect) may make an area more attractive for development (indirect effect). Generally, it would be reasonable to expect that projects on new locations or larger scale projects would have more potential to cause indirect effects than smaller scale projects or projects being constructed in already developed areas.

The indirect effects analysis includes evaluating development and land use trends in a defined study area and projecting areas of development that may be induced by the proposed project. Analyzing the likelihood of development in a defined study area once construction is completed is a key component of evaluating the potential for indirect effects.

Indirect effects analysis is based on requirements and processes outlined in 23 CFR 771, and guidance described in the Transportation Research Board's National Cooperative Highway Research Program *Report 466: Desk Reference for Estimating the Indirect Effect of Proposed Transportation Projects* (Transportation Research Board 2002), National Cooperative Highway Research Program *Report 25-25, Task 22*: *Forecasting Indirect Land Use Effects of Transportation Projects* (Transportation Research Board 2007), the Federal Highway Administration (FHWA) Technical Advisory 6640.8A, *Questions and Answers Regarding the Consideration of Indirect and Cumulative impacts in the NEPA Process* (FHWA 2003), and the Texas Department of Transportation's (TxDOT's) *Guidance on Preparing Indirect and Cumulative Impact Analyses* (TxDOT 2010).

This indirect effects analysis utilizes a seven-step process to identify potential indirect effects. The seven-step process was adapted from the method set forth in National Cooperative Highway Research Program Report 466. The following is a list of the seven steps.

- Step 1: Scoping
- Step 2: Identify the Study Area's Goals and Trends
- Step 3: Inventory the Study Area's Notable Features
- Step 4: Identify Impact-Causing Activities of Proposed Action and Alternatives
- Step 5: Identify Potentially Substantial Indirect Effects for Analysis
- Step 6: Analyze Indirect Effects and Evaluate Results
- Step 7: Assess Consequences and Consider/Develop Mitigation

The seven-step process serves as the basic approach for this indirect effects analysis. The primary resource was the *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009) prepared for the Cameron County Regional Mobility Authority (CCRMA). This report incorporates decennial census data; population projections; stakeholder interviews; expert surveys; demographic, economic and employment forecasts; and Mexican border influences.

A geographic information system-based analysis was used to quantify the data gathered. Given the nature of indirect effects, it must be stated that the analysis primarily relies upon projected

data. Anticipated demographic trends, travel demands, and recognized development trends, were used during the analysis.

The No-Build Alternative would not result in indirect effects associated with the construction or operation of the proposed project. The following steps include discussion of potential indirect effects associated with the proposed build alternatives.

2.4.18.1 Step 1: Scoping

Agency and community stakeholders and regional, county and city land use planning authorities were engaged in the project from the early planning stages to determine the likelihood of indirect and cumulative impacts from the proposed project. To determine the extent of potential induced development, city and county land use planning authorities in the study area were consulted in 2007, 2008 and 2009. Planners and planning experts were asked to give their opinions on the percentage of planned growth dependent on the proposed 2nd Access Project, and if possible, provide information on the size and location of this growth.

The indirect effects area of influence falls entirely within Cameron County and includes unincorporated areas, as well as the City of Port Isabel, the City of South Padre Island, the Town of Laguna Vista, the Town of Bayview, and the southern portion of the Laguna Madre. The indirect effects area of influence includes the area in which the proposed 2nd Access Project could influence local traffic patterns or land development. The indirect effects area of influence consists of approximately 233,205.6 acres. Indirect effects from the proposed project are analyzed through 2045, which is consistent with the *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009).

2.4.18.2 Step 2: Identify the Study Area's Goals and Trends

The proposed 2nd Access Project is within a mostly rural area with an established agricultural presence. Development within the indirect effects area of influence is increasing, and there are hundreds of acres of land available for development on the mainland and on the island. The Town of Laguna Vista has experienced the greatest increase in population and is currently implementing a strategy for commercial development. Growth of the City of Port Isabel, however, is constrained by the limited amount of developable land within its city limits. South Padre Island has and continues to experience growth through land development, tourism and redevelopment of existing areas. However, higher property values on the island are inhibiting commercial development; therefore, the focus of future commercial development is on the mainland (TXP, Inc. 2009).

Tourism, documented accommodation and food services as well as retail trade, is the major industry within the indirect effects area of influence. Out-of-town visitors, winter Texans and shoppers from Mexico spend millions of dollars at local hotels, restaurants and retail facilities each year. Economic development officials within the area indicate that tourism retention and expansion are the focal points of local efforts (TXP, Inc. 2009).

2.4.18.3 Step 3: Inventory the Study Area's Notable Features

Notable features within the indirect effects area of influence that could be indirectly impacted by the proposed 2nd Access Project include the following:

- **NF-1** = Threatened and endangered species habitat, including ocelot and jaguarundi habitat on the mainland, northern Aplomado falcon habitat on the mainland, Piping Plover USFWS -

designated critical habitat on South Padre Island and the mainland, West Indian manatee habitat within the Laguna Madre, and sea turtle habitat within the Laguna Madre and Gulf Side beaches of South Padre Island

- **NF-2** = Colonial waterbird rookeries on spoil islands within the Laguna Madre
- **NF-3** = Seagrasses within the Laguna Madre
- **NF-4** = Essential fish habitat
- **NF-5** = Prime farmland on the mainland
- **NF-6** = National wildlife refuges on the mainland
- **NF-7** = Public parks on South Padre Island
- **NF-8** = Coastal Barrier Resources Act lands

2.4.18.4 Step 4: Identify Impact-Causing Activities of the Proposed Action and Alternatives

The proposed 2nd Access Project consists of three major components: the mainland roadways, the Laguna Madre crossing and the island roadway. Tolling is proposed for the bridge and bridge approaches. Controlled access is proposed within the limits of tolling; outside the limits of tolling, the project would be non-controlled access. The following is a list of impact-causing activities for the proposed facility.

- **Modification of Regime** - Exotic Flora Introduction, Modification of Habitat, Alteration of Ground Cover, Alteration of Drainage
- **Land Transformation and Construction** - New Transportation Facility, Service or Support Sites and Buildings, Noise and Vibration, Cut and Fill
- **Resource Extraction** - Surface Excavation
- **Processing** - Product Storage
- **Land Alteration** - Erosion Control, Landscaping, Wetland Fill and Drainage, Fill into Open Waters
- **Resource Renewal** - Hazardous Materials Handling and Storage, Site Remediation
- **Changes in Traffic** - Transit (Bus), Automobile, Trucking, Pleasure Boating, Operational or Service Charge
- **Waste Emplacement and Treatment** - Emplacement of Soil and Overburden, Sanitary Waste
- **Chemical Treatment** - Fertilization, Weed Control, Pest Control
- **Access Alteration** - New or Expanded Access to Activity Center, New Or Expanded Access to Undeveloped Land, Alter Travel Circulation Patterns, Alter Travel Times between Major Trip Productions and Attractions, Alter Travel Costs between Major Trip Productions and Attractions

2.4.18.5 Step 5: Identify Potentially Substantial Indirect Effects for Analysis

There are three broad categories of indirect effects (National Cooperative Highway Research Program 2002):

1. Encroachment-Alteration Effects: Alteration of the behavior and functioning of the affected environment caused by project encroachment (physical, chemical, biological) on the environment.
2. Induced Growth Effects: Project-influenced development effects from development of undeveloped land or redevelopment to more intensive uses.
3. Effects Related to Induced Growth: Effects related to project-influenced development

effects. These effects are similar to encroachment-alteration effects, but occur as a result of induced growth.

According to the *Proposed South Padre Island Second Access Economic Analysis* (TXP 2009), the proposed project could induce up to 402.1 acres of development in the project vicinity. Indirect impacts could result from encroachment of the project on adjacent habitats, and through inducement of area growth, potentially impacting habitat.

Regional economic development, which is based on tourism, is the driving force behind land development within the indirect effects area of influence. Because of the variability of the economic markets over time, there is a high level of uncertainty in the timing of development. Considering the indirect effects area of influence's potential for growth, the proposed project has the potential to influence the location, timing and intensity of development within the indirect impacts area of influence.

Development intensity, or density, in the indirect effects area of influence is dependent on the availability of water and wastewater services and other utilities. Much of the indirect effects area of influence available for development lacks this essential infrastructure and would have to account for this need. However, eventual build-out of remaining developable land within the indirect effects area of influence is anticipated to occur with or without the proposed 2nd Access Project. Therefore, indirect effects associated with induced-growth effects from the proposed 2nd Access Project are not considered substantial since growth and effects from growth would occur with or without the proposed project.

2.4.18.6 Step 6: Analyze Indirect Effects and Evaluate Results

The majority of the eight notable features are not anticipated to be substantially impacted by the proposed 2nd Access Project. Anticipated indirect impacts to ocelot/jaguarundi, Northern Aplomado Falcon, Brown Pelican, Piping Plover, and sea turtles species (Kemp's ridley, loggerhead, green), if unmitigated, would be considered substantial. However, with mitigation proposed for these species, impacts would be considered not substantial. Conversely, it is anticipated that there would be potentially substantial indirect effects to seagrasses and essential fish habitat from the proposed 2nd Access Project.

2.4.18.7 Step 7: Assess Consequences and Consider/Develop Mitigation

Potential indirect effects to notable features are not anticipated to be substantial, with the exception of encroachment-alteration impacts to seagrasses and essential fish habitat. There are two indirect effects that may be considered substantial with respect to impacts to seagrasses:

1. Modification of currents in the Laguna Madre, potentially resulting in scouring of the bay floor and an alteration of the existing suspended sediment regime. A detailed scour analysis of the structure would be conducted during the design phase of the project to determine if there would be an increase in scouring resulting in indirect impacts to seagrasses.
2. Shading from the bridge structure would decrease the light availability and penetration through the water to the appropriate depth for seagrasses.

There are two indirect effects that may be considered substantial with respect to impacts to essential fish habitat:

1. The loss of coastal wetlands, seagrasses, and tidal flats would have the potential to

adversely affect essential fish habitat and the associated managed species.
2. Decreased water quality would cause a functional impairment of essential fish habitat primarily due to the increase in suspended sediments.

Initial mitigation measures in the planning or alignment of highway projects minimize the probable occurrence of impacts through route location (avoidance/minimization) and construction practices. Activities to minimize the impacts to habitats from highway construction would include the following: minimizing devegetation of the construction area wherever safety allows, decreasing the amount of fill placement and implementation of best management practices, including an erosion and sedimentation control plan.

Water quality protection is mandated by federal, state, and local regulations within the indirect effects area of influence. Water quality within the state of Texas is protected by Sections 401 and 402 of the Clean Water Act and the Texas Water Code. Section 401, Water Quality Certification of Federal Actions, requires that Best Management Practices be used to address erosion, sedimentation and post-construction total suspended solids control. The Cameron County Stormwater Management Plan addresses illicit discharge detection and elimination, as well as construction and post-construction stormwater management.

Proposed mitigation measures also include compensatory mitigation, such as the development of an area currently void of seagrasses in such a manner as to provide the hydrology, sediment and water quality to support the establishment of a seagrass bed. Compensatory mitigation would be used to mitigate for unavoidable direct and indirect shading impacts to the seagrass beds. The reestablishment of seagrass in propeller scarred areas would improve the seagrass habitat by restoring the beds to its original condition. Other mitigative measures such as public education/outreach, signage or the establishment of protection areas could also be incorporated into the mitigation plan.

Although indirect impacts alone (encroachment alteration, induced development, and effects related to induced development) to threatened and endangered species (NF-1) are not considered substantial, direct impact of the proposed project to ocelot/jaguarondi habitat and habitat connectivity is acknowledged. In response, proposed compensatory mitigation measures would include ocelot/jaguarundi underpasses (“wildlife crossings”) and, potentially, the acquisition of additional conservation land in the project area, offsetting connectivity impacts of the proposed roadway. These measures would be developed in consultation with the USFWS during roadway design, and would include fencing, when feasible, to minimize vehicle mortality of the ocelot accessing the underpasses.

Artificial lighting would be limited to the bridge structure, intersections and where necessary for safety. Low-impact artificial lighting would be used to minimize potential lighting encroachment effects to wildlife, especially sea turtles. Directional, shielded light fixtures that focus illumination downward to the roadway surface while minimizing lighting of the surrounding area would be incorporated into the final design.

2.4.19 Cumulative Impacts Analysis

CEQ regulations define a cumulative impact as an impact which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR Section 1508.7).

Cumulative impacts are the incremental impacts that the project's direct or indirect impacts have on a resource in the context of the myriad of other past, present and future impacts on that resource from related or unrelated activities. This analysis of cumulative impacts relies heavily on past land use impacts, existing land use impacts, the anticipated land use changes expected to occur in the project area, and the impacts these changes would have on the resources considered in this analysis. As a result, land use serves as the background for cumulative impacts analysis and would not be considered a resource itself.

The evaluation of cumulative impacts followed the eight steps in TxDOT's *Revised Guidance on Preparing Indirect and Cumulative Impact Analyses* (June 2009). This eight-step approach was utilized to assess the potential cumulative impacts of the past, present and reasonably foreseeable actions on the resources in the proposed study area. The eight-step methodology from TxDOT's *Guidance* is as follows:

- Step 1: Identify the resources to consider in the analysis
- Step 2: Define the study area for each affected resource
- Step 3: Describe the current status/viability and historical context for each resource
- Step 4: Identify direct and indirect impacts of the project that might contribute to a cumulative impact
- Step 5: Identify other reasonably foreseeable future effects
- Step 6: Identify and assess cumulative impacts
- Step 7: Report the results
- Step 8: Assess the need for mitigation

2.4.19.1 Step 1: Identify Resources

All of the resource categories considered in this draft environmental impact statement were candidates for analysis with regard to indirect and cumulative impacts. The initial step of the cumulative impacts analysis uses information from the evaluation of direct and indirect impacts in the selection of environmental resources that should be evaluated for cumulative impacts.

Applying the foregoing criteria, the resources or environmental issues considered for cumulative impacts assessment are listed below:

- Land Use
- Geology and Soils - Prime Farmland Impacts
- Community and Social Resources - Community Cohesion, Quality of Life, Relocation, Environmental Justice, Public Resources, Public Safety, Traffic, Travel Patterns and Accessibility
- Relocation and Displacement Impacts
- Regional Economy
- Traffic Noise Impacts
- Air Quality Impacts - CO and Ozone Impacts on 8-hour Ozone Standard, MSAT, Mobile Source Air Toxics: Air toxins load
- Water Quality
- Floodplain Impacts
- Waters of the U.S.- Freshwater Wetlands, Estuarine Wetlands
- Vegetation (non-regulatory) and Wildlife (not including threatened, endangered, or rare species) and their non-regulated habitats - Thorn-scrub brush, riparian, rangeland, fence line vegetation and terrestrial wildlife; Rare Vegetation Series (S1, S2, S3) and Seagrass

- Migratory Birds - Neotropical migrant songbirds; Waterfowl, Shorebirds, Wading Birds and Rookeries
- Essential Fish Habitat
- Threatened and Endangered Species and State–Listed Rare Species - Mainland Threatened and Endangered Species, Laguna Madre and Gulf of Mexico Threatened and Endangered Species, South Padre Island Threatened and Endangered Species
- Cultural Resource Impacts
- Visual and Aesthetic Impacts

It was determined that the proposed action would not have considerable direct or indirect impacts on the following resources: direct or regional land use; geology and soils including prime farmland; community and social resources including neighborhoods, residential areas, community cohesion, social groups, environmental justice populations, traffic and public safety, travel patterns and access; traffic noise levels, air quality, floodplains, vegetation and wildlife (not rare, threatened, or endangered); cultural resources including archeological and historic structural resources; hazardous materials; visual and aesthetic quality; or energy resources.

The project may substantially impact economic conditions in Cameron County; therefore, regional economics is included in cumulative impacts analysis. The following resources in the study area, although not substantially impacted by the project, may be considered to be in poor or declining health or alternatively of national, regional, or local significance, and therefore warrant inclusion in cumulative impacts analysis: surface water quality, freshwater wetlands, estuarine wetlands, threatened and endangered species and State-listed Rare Species, rare vegetation series and seagrass, essential fish habitat and migratory birds, including rookeries. To facilitate analysis, threatened and endangered species and rare species were separated into three geographic groups – mainland species, Laguna Madre species and Padre Island species.

2.4.19.2 Step 2: Define Resource Study Areas (RSAs)

In Step 2, a resource-specific study area is defined for each resource. The setting of spatial limits for the study of each resource, a resource study area (RSA), also known as “zone of potential impact”, was established using TxDOT/CEQ criteria, and in consideration of each resource’s physical characteristics, biological relationships and regulatory jurisdictions. The geographic study area is described below for each resource considered in the analysis.

Regional Economics RSA - The Cameron County government and the Cameron County Regional Mobility Authority (CCRMA) play significant roles in major transportation project planning within the county. As a result, the RSA for regional economics is Cameron County.

The RSAs for natural resources (freshwater wetlands, estuarine wetlands, threatened and endangered species, essential fish habitat, migratory birds, and rare vegetation series/seagrass) are watershed-based.

Most of Cameron County is bounded by three water bodies, the Arroyo Colorado, the Rio Grande, and the Gulf of Mexico. The eastern section of the Arroyo Colorado either forms or closely coincides with the Cameron/Willacy county line. These water bodies, along with the associated Cameron/Willacy County line, were used as boundaries for most natural resource RSAs, with exceptions as noted below. Also except as noted below, western RSA boundaries were set at the Cameron/Hidalgo County line. While this does not represent a natural boundary, it is located approximately 35 miles from the SPI 2nd Access project area, sufficiently far that cumulative effects associated with the project would be expected to be minimal.

Water Quality RSA – Bounded by Arroyo Colorado/Cameron County line, Rio Grande, and Gulf of Mexico, inclusive of waters within these segments.

Freshwater Wetlands RSA – Bounded by Arroyo Colorado/Cameron County line, Rio Grande, and Gulf of Mexico. National Wetland Inventory freshwater wetlands are found throughout the mainland; however, they are most concentrated in the eastern half of the mainland. A few National Wetland Inventory freshwater wetlands also occur on Padre Island.

Estuarine Wetlands RSA – Bounded by Arroyo Colorado/Cameron County line, Rio Grande, and Gulf of Mexico. However, because National Wetland Inventory estuarine wetlands are concentrated near the Laguna Madre and do not occur in the western portion of Cameron County, the western boundary was established (using GIS) from approximately one to five miles (variably) west of the Laguna Madre, near the western extent of National Wetland Inventory estuarine wetland occurrence.

Threatened and Endangered Species RSA – Because of the dissimilarity of habitats and associated species between the mainland, Padre Island, and the Laguna Madre/Gulf of Mexico, threatened and endangered species were divided accordingly into three RSAs.

a. Mainland - Bounded by Arroyo Colorado/Cameron County line, Rio Grande, and the Laguna Madre. Habitats include thorn-scrub brush, grassland/rangeland, and wetland. A subsets of this RSA solely comprised of thorn-scrub brush was utilized to assess cumulative impacts to Ocelot/Jaguarundi, and a subsets of this RSA solely comprised of grassland/rangeland was utilized to assess cumulative impacts to and Northern Aplomado Falcon.
b. Laguna Madre and Gulf of Mexico – The waters of Laguna Madre and Gulf of Mexico, to the southern and northern extents of the lower Laguna Madre, which extends northward into Willacy County.
c. Padre Island – Bounded by the Laguna Madre, Gulf of Mexico, and the Cameron/Willacy county line (associated with the Arroyo Colorado, as discussed previously).

Rare Vegetation and Seagrass RSA – Bounded by Arroyo Colorado/Cameron County line, Rio Grande, and Gulf of Mexico, but includes the waters of the entire lower Laguna Madre extending north into Willacy County.

Essential Fish Habitat RSA - The waters of lower Laguna Madre, which extend north into Willacy County.

Migratory Bird RSA - Bounded by Arroyo Colorado/Cameron County line, Rio Grande, and Gulf of Mexico.

2.4.19.3 Step 3: Health and Historic Context of Resources

The examination of the current health and historical context of each resource is necessary to establish a baseline for determining the impacts of the proposed action and other reasonably foreseeable actions on the resource. For each resource, special concerns identified from the direct and indirect impacts analyses and the resource's present abundance and quality were evaluated. The impacts of historical activities, the resource's response to those activities, and the continuing stresses imposed on the resource and resource resilience to these stresses were considered.

Information on the various resources studied was digitized, and spatial data were developed through the use of geographic information systems software. A summary of each resource category and health is as follows:

- Socioeconomic = Poor
- Water Resources = Poor
- Freshwater wetlands and other waters of the U.S. = Declining
- Estuarine wetlands = Declining
- State–Listed Rare Species, Mainland Threatened and Endangered Species and rare species and their habitats = Declining
- State–Listed Rare Species, Laguna Madre and Gulf Threatened and Endangered Species and rare species and their habitats = Declining
- State–Listed Rare Species, Island Dune and Beach Threatened and Endangered Species and rare species and their habitats = Declining
- Rare Vegetation Series and Seagrass = Declining
- Essential Fish Habitat = Declining
- Migratory Birds and Rookeries = Stable

2.4.19.4 Step 4: Identify Direct and Indirect Impacts of Project

The analysis of cumulative impacts must consider the direct and indirect impacts of the proposed action within the RSAs. Identification of the direct and indirect impacts of the proposed action would also assist in determining the project's contribution to the cumulative impact on the resource. The direct and indirect impacts expected from the proposed project were discussed in detail in **Chapters 4** and **5**, respectively.

2.4.19.5 Step 5: Reasonably Foreseeable Actions

This portion of the cumulative impacts analysis identifies other transportation projects and planned large-scale public or private developments. The identification of other past, present and reasonably foreseeable future actions for the respective RSAs was based on a review of proposed and ongoing development projects, local municipality plans, master plan communities and county economic development studies. Experts on land use planning and development and local planners in the region were surveyed during development of *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009). Past, current and planned transportation projects were determined from the Brownsville and Harlingen-San Benito MTPs, the City of Brownsville's *Imagine Brownsville Comprehensive Plan* report and *Proposed South Padre Island Second Access Project Economic Analysis*, information from the *South Padre Island Comprehensive Plan* (2008) and from the City of Port Isabel *Comprehensive Plan* (2005). In addition to site-specific development plans, the anticipated impacts from the eventual development of the watershed RSA, as reflected in comprehensive land use plans, were considered in reviewing future impacts to resources. From these data sources, it was determined that a maximum cumulative conversion of 32,947 acres of undeveloped land to developed land is possible.

2.4.19.6 Steps 6, 7 and 8: Assess Cumulative Impacts, Report Results and Discuss Mitigation

Cumulative impacts are evaluated using the following factors: the historical context of each resource, current condition and trend, future land use and zoning plans and the pertinent regulations and standards associated with each resource. These factors capture the influences

that have shaped and are shaping the amount and quality of each resource, and which would continue to shape the resources into the future. Several key assumptions that are implicit in the approach to predicting the future condition of resources include:

- All reasonably foreseeable actions would be completed as currently planned;
- The relationships between the resources, ecosystems and human communities that have been identified from historical experience would continue into the future; and
- The sponsors of government and private projects would abide by relevant federal, state and local laws designed to protect each resource, and regulatory agencies would perform their duties in accordance with legal requirements and internal guidelines.

Of particular importance is the assumption concerning compliance with relevant environmental laws designed to ensure the sustainability of resources. Over the past several decades, federal, state and local lawmaking bodies have enacted statutes, regulations and ordinances designed to preserve and enhance the abundance and quality of natural resources by requiring project sponsors to avoid, minimize and mitigate the environmental impacts of their projects or actions. The cumulative impacts analysis focuses on the net effects on each resource that remain after full compliance with the regulatory requirements at all levels and in light of mitigation that would likely be applied. The discussion of cumulative impacts for each resource studied first outlines key regulatory measures government leaders and agencies have implemented to manage and sustain the resource for long-term use, then evaluates expected net cumulative impacts for each of the resources analyzed.

In order to have a cumulative impact on a resource, the proposed action must have either a direct or indirect impact on that resource. Additionally, the cumulative impact analysis focuses on those resources impacted by the proposed action and resources currently in poor or declining health, even if the impacts resulting from the project are relatively small (less than significant). Lastly, resources of importance to stakeholders are considered. All of the resource categories considered in this draft environmental impact statement are candidates for analysis with regard to indirect and cumulative impacts.

Cumulative impacts are analyzed in terms of the specific resource being affected. The following table includes a summary of the cumulative impacts for each resource considered in the cumulative impacts analysis.

Table ES-4: Summary of Cumulative Impacts Analysis

RSA	Past Actions	2nd Access Project Direct/Indirect	Reasonably Foreseeable Future Actions	Total Cumulative Effect
Regional Economics	14,097 jobs between 2000 and 2008	2,583 jobs by 2045	93,916 jobs by 2040 2,554 jobs by 2045	113,150 jobs by 2045
Surface Water Quality	95,542.1 acres development	438.8 acres development	6,665.8 acres development	102,646.7 acres of development
Waters of the US - Freshwater Wetlands	1,457.0 acres impact	51.7 acres impact	359.5 acres impact	1,868.1 acres impact
Waters of the US - Estuarine Wetlands	1,291.9 acres impact	52.4 acres impact	491.7 acres impact	1,548.9 acres impact
Threatened and Endangered Species – Mainland	14,853.3 acres impact	454.2 acres impact	7,795.5 acres impact	18,930.7 acres impact
Northern Aplomado Falcon	6,564.8 acres impact	410.4 acres impact	1,846.8 acres impact	8,821.9 acres impact
Ocelot/Jaguarundi	7,022.9 acres impact	152.8 acres impact	1,945.0 acres impact	9,120.6 acres impact
Threatened and Endangered Species - Laguna Madre	2,263.7 acres development	515.4 acres development adjacent to RSA 113.8 acres impact	468.3 acres development adjacent to RSA	3,134.1 acres development adjacent to RSA 113.8 acres impact
Threatened and Endangered Species – Island	738.4 acres impact	103.2 acres impact	248.0 acres impact	1,027.2 acres impact
Piping Plover	4,670.0 acres impact	34.1 acres impact	248.0 acres impact	4,952.1 acres impact
Rare Vegetation and Seagrasses	15,508.2 acres impact	287.3 acres impact	4,991.3 acres impact	20,786.8 acres impact
Essential Fish Habitat	No development within RSA	140.9 acres impact	7,622.1 acres development adjacent to RSA	140.9 acres impact within RSA 7,622.1 acres development adjacent to RSA
Migratory Birds	14,685.3 acres impact	622.9 acres impact	4,228.1 acres impact	22,536.7 acres impact

Source: HNTB 2009

2.5 MITIGATION AND PERMITTING

Practicable efforts have been made in the planning process to avoid impacts to the human and natural environments. When impacts are unavoidable, steps would be taken first to minimize impacts and then to mitigate for impacts, as required under NEPA, FHWA and TxDOT guidelines. According to the CEQ regulations (40 CFR 1508.20), mitigation efforts may be defined as:

- Avoiding an impact altogether
- Minimizing the impact by limiting the degree or magnitude of the action
- Rectifying the impact
- Repairing, rehabilitating, restoring the resource
- Reducing or eliminating the impact over time
- Preservation and maintenance activities

- Compensating for the impact
- Replacing or providing substitutes to the resource impacted

Efforts have been made in the selection of alternatives and the identification of the recommended preferred alternative to avoid or minimize adverse effects. Where impacts to resources require coordination and permitting, required processes would be followed with the appropriate agency with resource jurisdiction. Given the environmental sensitivity of the project area and the scope of the proposed project, the project sponsors (TxDOT and CCRMA) are committed to developing a comprehensive mitigation plan for the proposed project. The plan will be developed in cooperation with state and federal resource agencies and will be designed to mitigate for unavoidable project impacts in accordance with applicable requirements of state and federal law.

The U.S. Fish and Wildlife Service (USFWS), the U.S. Army Corps of Engineers (USACE), the USCG, and the National Ocean and Atmospheric Administration Fisheries Service (NOAA Fisheries) have jurisdiction over specific resources potentially impacted by the proposed 2nd Access Project and, at the invitation of the FHWA, are officially serving in a cooperating agency role. It is anticipated that the proposed project would require the following approvals/permits:

- USACE Section 404 individual and/or nationwide permit for impacts to wetlands and waters of the U.S. and appropriate mitigation plan
- USACE Section 10 permit
- TCEQ Texas Pollution Discharge Elimination System (CWA Section 402) Construction General Permit
- USFWS and NOAA Fisheries consultation under Section 7 of the Endangered Species Act
- USCG Section 9 Bridge Permit
- Texas Commission on Environmental Quality Section 401 Water Quality Permit
- Texas General Land Office lease for impacts to state owned submerged lands
- Texas Parks and Wildlife Department transplant permit for authorized mitigation involving the transplant of aquatic vegetation

As demonstrated in this draft environmental impact statement, avoidance, minimization, and mitigation of potential project-related impacts has been a primary objective throughout the planning process. When avoidance is not possible, steps would be taken to minimize impacts. The comprehensive mitigation plan for the project would provide, when warranted, appropriate compensation for unavoidable impacts.

Preliminary mitigation options are currently being evaluated for each impacted environmental resource. Detailed discussions regarding these mitigation options with resource agencies will help formulate the comprehensive mitigation plan used for permitting the proposed project. The following table (**Table ES-5**) shows the direct impact for each resource and potential mitigation options currently being evaluated by the project team. The mitigation options and details will be developed further through more detailed studies of resources during the final environmental impact statement and ongoing agency coordination. Indirect impacts from the proposed project will also be further evaluated and coordinated with resource agencies for mitigation consideration.

Table ES-5: Potential Mitigation Options

Environmental Resource	Range of Potential Direct Impacts (acres)		Potential Mitigation Options	Potential Mitigation Ratios*	Est. Acreage Needed*
Piping Plover Habitat	1.03 ac - 13.93 ac		• purchase of private land within Piping Plover habitat for state protection • purchase sub-optimal land adjacent to critical habitat • funding for agency to conduct research on Piping Plover abundance and habitat use	1:1 - 2:1	14 - 26 ac
Ocelot/Jaguarundi Habitat	4.79 ac - 119.34 ac		• wildlife crossings/fencing • acquisition of additional conservation land • acquisition of areas with appropriate soil types for conversion	4 wildlife crossings/fencing	To be determined
Aplomado Falcon Habitat	135.52 ac – 248.10 ac		• acquisition of additional conservation land • monitoring and nest construction within LANWR/other habitat	To be determined	To be determined
Manatee/Sea Turtle Habitat	72.75 ac – 113.26 ac		• in conjunction with seagrass and wetland mitigation	1:1 - 3:1	Included below
Wetlands (includes Essential Fish Habitat)	Forested/ Shrub	0.00 ac - 0.46 ac	• in conjunction with falcon habitat	2:1 for low quality 4:1 for medium quality 6:1 for high quality	1 ac
	Seagrass	21.40 ac - 47.94 ac	• seagrass planting • reestablishment in propeller scarred areas • public education/outreach • signage/establishment of protected areas	3:1 direct 1:1 indirect	121 ac unknown
	Freshwater	5.98 ac - 38.13 ac	• purchase of land for wetland creation • donation to agency restoration project	2:1 for low quality 4:1 for medium quality 6:1 for high quality	23 - 152 ac
	Saltmarsh	0.00 ac - 2.36 ac	• purchase of land for wetland creation • donation to agency restoration project	2:1 for low quality 4:1 for medium quality 6:1 for high quality	7 - 14 ac
	Mud Flats/Salt Flats	5.05 ac - 19.80 ac	• purchase of land for wetland creation • donation to agency restoration project	2:1 for low quality 4:1 for medium quality 6:1 for high quality	41 - 79 ac
	Open Water	68.78 ac - 73.64 ac	• purchase of land for wetland creation • donation to agency restoration project	1:1	68 - 73 ac
Vegetation Communities	Black Mangrove	0.00 ac - 0.13 ac	• at the District's discretion	3:1	.5 ac
	Riparian	0.20 ac - 8.87 ac	• at the District's discretion	3:1	16 - 26 ac
	Dune	0.00 ac - 50.32 ac	• in conjunction with Piping Plover habitat • use of construction materials for dune creation • donation to agency restoration project • requires Dune Protection Permit from Texas General Land Office	1:1	0 - 50 ac

*Preliminary estimates based on data presented in the DEIS and typical anticipated ratios for mitigation; however, further agency coordination/permitting will be needed to determine the final mitigation ratios, acreages needed, and monitoring requirements.

2.6 AGENCY COORDINATION AND PUBLIC INVOLVEMENT

TxDOT and the FHWA filed a Notice of Intent to prepare and consider an environmental impact statement for the South Padre Island 2nd Access Project on April 23, 2008. The Notice of Intent was published in the *Federal Register* on April 23, 2008, and in the *Texas Register* on April 29, 2008.

CCRMA and TxDOT in coordination with the FHWA, the lead federal agency, prepared a project coordination plan to facilitate and document the lead agencies' CCRMA, TxDOT and FHWA structured interaction with the public and other agencies and to inform the public and other agencies of how the coordination would be accomplished. The project coordination plan outlines how the lead agencies have divided the responsibilities for compliance with the various aspects of the environmental review process, such as the issuance of invitations to participating agencies, and how the lead agencies would provide opportunities for input from the public and other agencies, in accordance with applicable laws, regulations, and policies. The project coordination plan was prepared to meet the requirements of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, Title VI, Section 6002, and was formally approved by FHWA on January 23, 2009 (**Appendix B**).

The Project Coordination Plan identified potential participating/cooperating agencies for the proposed project. Cooperating agencies are defined as federal agencies with special expertise pertaining to the proposed project or which have jurisdiction by law. Participating agencies may include local, state and federal agencies with special interest in a proposed project.

The USFWS, the USCG, the USACE and NOAA Fisheries have jurisdiction over specific resources potentially impacted by the proposed 2nd Access Project and, at the invitation of the FHWA, are officially serving in a cooperating agency role.

Participating agencies in the project development process include:

- Texas General Land Office
- Texas Parks and Wildlife Department (TPWD)
- Texas Historical Commission (THC)
- Texas Commission on Environmental Quality (TCEQ)

Representatives of the cities of Brownsville, South Padre Island, Harlingen, Laguna Vista, Los Fresnos, Port Isabel and Bayview have actively participated in the agency coordination and public involvement process.

Coordination with resource agencies has focused on potential impacts to wetlands, seagrasses and threatened and endangered species within the project area. Resource agencies have worked closely with the project team through participation in the NEPA Technical Working Group and the agency scoping meeting held in 2008. CCRMA and TxDOT are committed to working with resource agencies to develop and implement an ecosystem-based mitigation plan for the proposed project.

Scoping for the proposed 2nd Access Project included a series of three public scoping meetings and an agency scoping meeting. The public scoping meetings were held at strategic milestones in the project development process and each meeting focused on a specific aspect of the alternatives development process. Public scoping meetings were held on May 22, 2008; November 6, 2008; and February 6, 2009. An agency scoping meeting was held on May 22, 2008.

In recognition of the large Spanish-speaking population and the presence of environmental justice populations in the study area, public notices were published in English and Spanish. Meeting hand-outs and other printed materials were available in both English and Spanish. Spanish-speaking project team members were present at the meetings and available to interact with/answer questions from individuals with limited English proficiency. Although technical presentations were made in English, Spanish translators were available to those requesting translation.

Public scoping meetings were also announced via the project website (http://cameroncountyrma.org/SPI2ndAccess/index.asp?p=home), media releases and placement of a changeable message board at the foot of the existing causeway.

Community participation is an important aspect of any major project. TxDOT and CCRMA have ensured that opportunities for community input in the project development process have been and will continue to be provided. Any future public involvement efforts, including the public hearing, will continue to utilize the same or similar publications and tools to notify environmental justice and limited English proficiency populations in the study area.

At Public Scoping Meeting #1, the draft project coordination plan and the draft need and purpose were presented to the public for review and comment. At Public Scoping Meeting #2, the project team presented and solicited public comment on the universe of alternatives, preliminary alternatives and the screening process used to identify the preliminary alternatives. At this public scoping meeting, the draft reasonable alternative evaluation criteria were also presented for public comment. At Public Scoping Meeting #3, the results of the preliminary alternative to reasonable alternative evaluation process were presented and public input was solicited.

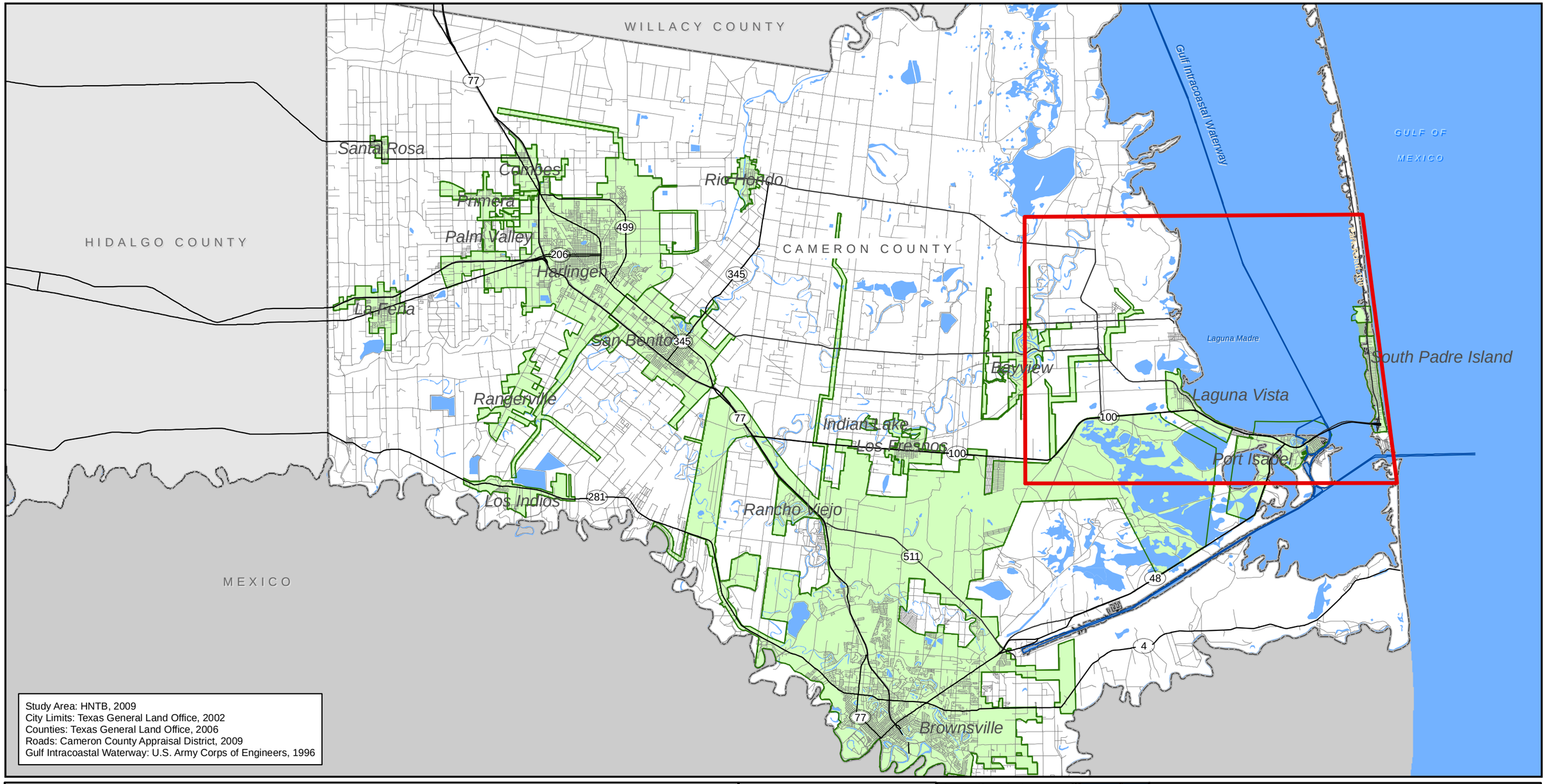
To further facilitate and encourage public engagement in the project development process, a series of context sensitive solution workshops were also conducted from October 2008 to September 2009.

Five technical working groups were formed to aide in guiding the project development process. Each working group represented a specific area of technical expertise. The technical working groups consisted of the Public Involvement Technical Working Group, the Economic Development Technical Working Group, the Engineering Technical Working Group, the NEPA Technical Working Group, and the Funding Technical Working Group. The group meetings occurred from April 2008 to October 2009.

Public controversy to date has been minimal. Early in the scoping process for this environmental impact statement, a number of comments were received questioning the appropriateness of SH 100 as logical termini. SH 100 currently exists as a major four-lane highway connecting United States Highway (US) 77/83 and South Padre Island. The size, function and capacity of existing SH 100 ensures that, even if no other transportation projects were implemented, the proposed 2nd Access Project would, by terminating at SH 100, be functional and constitute a reasonable expenditure of transportation dollars. By utilizing SH 100 as logical termini, the project is also of sufficient length to address environmental matters on a broad scope. Lastly, terminating the proposed 2nd Access Project at SH 100 does not restrict the consideration of alternatives for other reasonably foreseeable transportation improvements. Therefore, SH 100 satisfies all applicable criteria and is appropriate as logical termini for the proposed project.

2.7 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Impacts to the social, economic, natural, and cultural environment would result from construction of any of the reasonable alternatives evaluated in detail in this document. **Table ES-2** summarizes the potential impacts for the reasonable alternatives including the recommended alternative. The alternatives were developed within the South Padre Island 2nd Access Project study area through avoidance and minimization of impacts to a number of resources, while addressing the project's need and purpose and providing feasible engineering alternatives.



Study Area
City Limits
County
Major Roads
Minor Roads
Gulf Intracoastal Waterway

N
W E
S

1:253,440

0 15,000 30,000
Feet

0 4
Miles

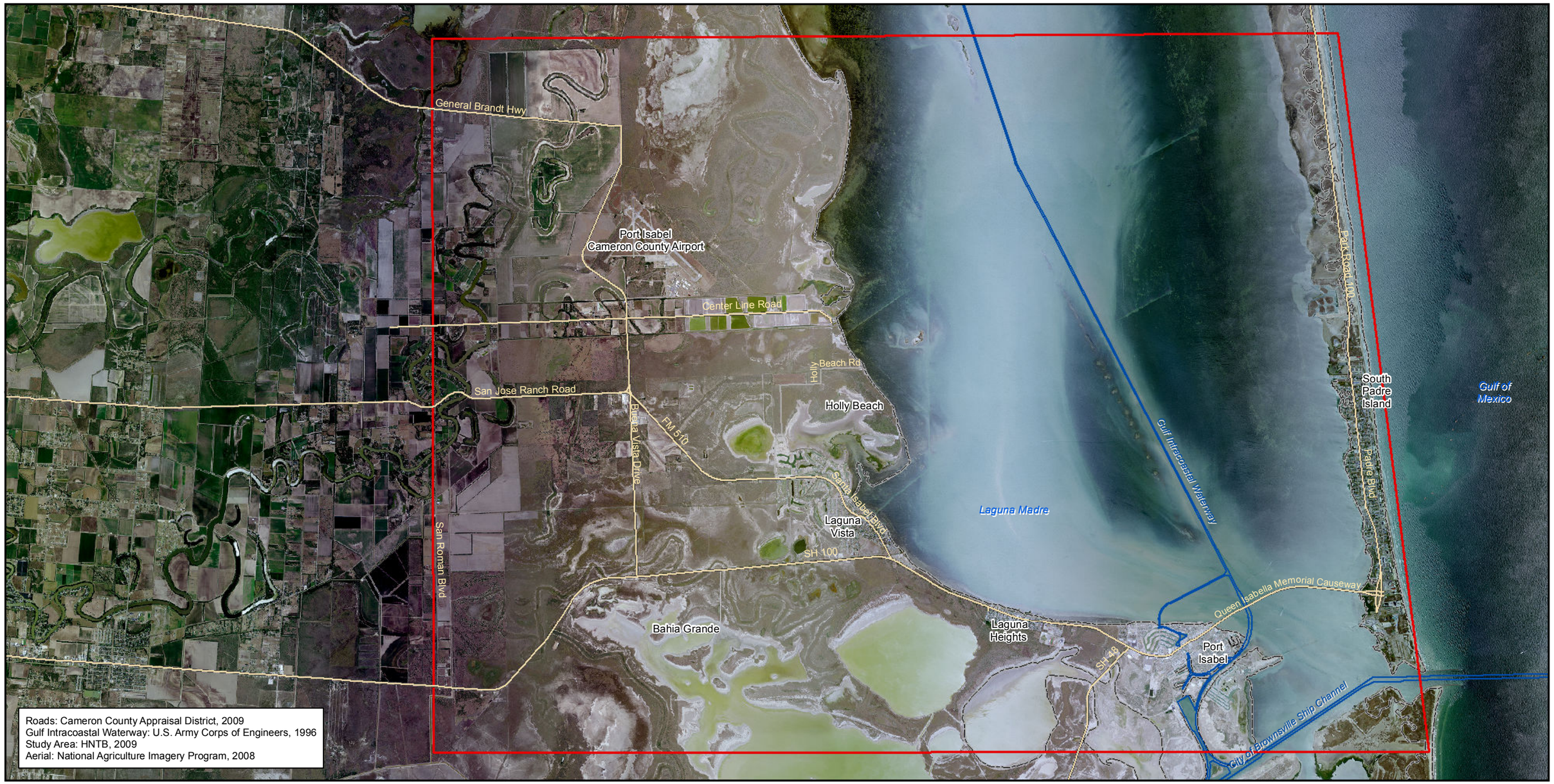
CCRMA
Texas Department of Transportation

Proposed 2nd Access Project Location

EXHIBIT ES - 1

South Padre Island
2nd Access Project
CSJ: 0921-06-163

Cameron County, Texas



Study Area
County
Major Roads
Gulf Intracoastal Waterway

N
W E
S

1:95,040

0 4,800 9,600
Feet

0 0.5 1 1.5 2
Miles

CCRMA
Texas Department of Transportation

Major Roads in Study Area

EXHIBIT ES-2

South Padre Island
2nd Access Project
CSJ: 0921-06-163

Cameron County, Texas

General Brandt Hwy
Port Isabel
Cameron County Airport
Center Line Road
San Jose Ranch Road
Buena Vista Drive
FM 510
San Roman Blvd.
Holly Beach
Laguna Madre
Laguna
Vista
SH 100
El Tular
Bahia Grande
Gulf Intracoastal Waterway
The Shores
Andy Bowie Park
South
Padre
Island
Gulf of
Mexico
Padre Blvd.
Queen Isabella Memorial Causeway
Laguna
Heights
SH 48
Port
Isabel
Park Road 100
City of Brownsville Ship Channel

Alternatives: HNTB, 2009
Roads: Cameron County Appraisal District, 2009
Gulf Intracoastal Waterway: U.S. Army Corps of Engineers, 1996
Study Area: HNTB, 2009
Aerial: National Agriculture Imagery Program, 2008

Alternative 1
Alternative 2
Alternative 3
Alternative 4
Alternative 5
Alternative 6
Alternative 7
Alternative 8
Alternative 9
Alternative 10
Alternative 11
Major Roads
Minor Roads
Gulf Intracoastal Waterway
Study Area

N
W E
S

1:95,040

0 5,000 10,000
Feet

0 0.5 1 1.5 2
Miles

WILLACY
HIDALGO
CAMERON
Mexico

CCRMA
Texas Department of Transportation

Reasonable Alternatives

EXHIBIT ES-3

South Padre Island
2nd Access Project
CSJ: 0921-06-163

Cameron County, Texas

CHAPTER 1

NEED AND PURPOSE

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

NEED AND PURPOSE

The Cameron County Regional Mobility Authority (CCRMA), in cooperation with the Texas Department of Transportation (TxDOT) and the Federal Highway Administration (FHWA), has initiated development of a project in Cameron County, Texas, that would provide an alternate route connecting South Padre Island and the mainland. The proposed 2nd Access Project would extend from State Highway (SH) 100 on the mainland to Park Road 100 on South Padre Island; SH 100 and Park Road 100 have been determined to be "logical termini" for the proposed project.

The proposed project is not located within an urbanized area or within the boundaries of a Metropolitan Planning Organization area; therefore, it is not included in a Metropolitan Transportation Plan. Because the project is currently unfunded and planned for letting beyond the current Statewide Transportation Improvement Program timeframe, the project is not currently included in the *2011–2014 Statewide Transportation Improvement Program*. However, it is anticipated that the proposed project would be included in a future Statewide Transportation Improvement Program.

FHWA regulations regarding the implementation of the National Environmental Policy Act (NEPA) process requires that each environmental document identify the project limits between two logical termini. In selecting logical termini for a project, the proposed project must 1) be of sufficient length to address environmental matters on a broad scope; 2) have independent utility or independent significance (i.e. be usable and be a reasonable expenditure even if no additional transportation improvements in the area are made); and 3) not restrict consideration for other reasonably foreseeable transportation improvements.

Early in the scoping process for this environmental impact statement, a number of comments were received questioning the appropriateness of SH 100 as logical termini. SH 100 currently exists as a major four-lane highway connecting United States Highway (US) 77/83 and South Padre Island. The size, function and capacity of existing SH 100 ensures that, even if no other transportation projects were implemented, the proposed 2nd Access Project would, by terminating at SH 100, be functional and constitute a reasonable expenditure of transportation dollars (criteria 2). By utilizing SH 100 as logical termini, the project is also of sufficient length to address environmental matters on a broad scope (criteria 1). Lastly, terminating the proposed 2nd Access Project at SH 100 does not restrict the consideration of alternatives for other reasonably foreseeable transportation improvements (criteria 3). Therefore, SH 100 satisfies all applicable criteria and is appropriate as logical termini for the proposed project.

South Padre Island is a barrier island located along the southern Texas Gulf Coast. The only roadway access from the mainland to South Padre Island is currently provided via SH 100 and the Queen Isabella Memorial Causeway. In Port Isabel, SH 100 is a four-lane divided roadway with either a continuous left turn lane or landscaped median. The Queen Isabella Memorial Causeway, located on SH 100 east of Port Isabel, is a four lane roadway connecting the mainland to South Padre Island. SH 100 intersects Park Road 100 on the island. Park Road 100, which traverses the City of South Padre Island, is a four lane divided roadway with a continuous left turn lane for most of its length. There are six signalized intersections along SH 100 between SH 48 and the Queen Isabella Memorial Causeway. On the island, there are five signalized intersections along Park Road 100.

The study area for the 2nd Access Project is in eastern Cameron County and is identified on **Exhibit 1-1.** Cities and towns within the study area include South Padre Island, Port Isabel, Laguna Heights, Laguna Vista, Brownsville and Bayview.

The proposed 2nd Access Project is being developed in anticipation of federal financial assistance; thus, the project is being developed in accordance with FHWA rules and regulations implementing NEPA. The NEPA process for this project is utilizing mechanisms for streamlining the environmental process as outlined in 23 USC Section 139 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users. FHWA is the lead federal agency. CCRMA and TxDOT are co-lead agencies. Although a combination of federal and other funding is anticipated, to date, the project remains unfunded.

Texas, like much of the Country, is in the midst of a severe transportation funding shortfall. Due to this shortfall, TxDOT and its partners have been unable to keep pace with the demand for new and/or improved transportation facilities utilizing traditional funding methods alone.

The Federal Highway Trust Fund is the primary source of federal transportation funding. Texas and other states pay into the fund via collection of user fees (primarily motor fuel taxes). Since the fund was created in 1956, Texas has received only about 80 percent of the fees being paid into the fund by its residents. In 2005 alone, Texas paid over $500 million more in federal user fees than it received from the Federal Highway Trust Fund. Texas is currently the largest "donor state" in the Country meaning more in-state generated revenue is allocated to other parts of the country than any other state in the Union.

State (non-federal) motor fuel taxes are also a significant source of revenue for the Texas' transportation construction program. However, only 72 percent of collected revenue is directed to the State Highway Fund. The remaining 28 percent is diverted to public schools and other expenses.

The federal and state gas taxes have not increased since 1997 and 1991, respectively. Inflation, the demands of a growing population, the effects of more fuel efficient vehicles, and diversion of transportation dollars to other programs collectively have contributed to the current, severe funding shortfall.

Due to limited availability of state and federal funding, TxDOT and CCRMA have decided to use tolling as a way to leverage additional funding; thereby, expediting delivery of the much needed 2nd Access Project. As currently proposed, only the crossing of the Laguna Madre and approaches would be tolled. Other sections of the proposed project would not be tolled.

This chapter documents the project history (**Section 1.1**) and describes the need and purpose of the proposed 2nd Access Project (**Section 1.2 and 1.3**).

1.1 PROJECT HISTORY

South Padre Island is located at the southern tip of Texas, on the eastern edge of Cameron County, approximately 8 miles north of the Mexican border. The island is approximately 34 miles long from the Port Mansfield Channel to Brazos Santiago Pass at the southern end of the island and approximately 0.5 mile wide within the City of South Padre Island and approximately 3 miles wide at its widest point. The Queen Isabella Memorial Causeway is the only roadway access to South Padre Island. There are three major roadways that feed traffic onto the Queen Isabella Memorial Causeway and South Padre Island (**Exhibit 1-2**): Farm-to-Market Road

(FM) 510, SH 100 and SH 48.

The first roadway access to the island occurred in 1954 with the construction of the original Queen Isabella Causeway between Port Isabel and the southern end of the island. On July 17, 1970, TxDOT filed an application with the U.S. Coast Guard (USCG) for a permit to build a new bridge to connect the City of Port Isabel to South Padre Island. TxDOT received a permit from the USCG with the condition that the original Queen Isabella Causeway be removed (USCG 2001). TxDOT built the existing causeway across the Laguna Madre in 1974. At that time, the center section of the original causeway was removed and the remaining sections were transferred to the Texas Parks and Wildlife Department (TPWD) for operation as a fishing pier (Long 2009).

The 1974-built causeway, which was constructed just north of the original Queen Isabella Causeway, currently serves as the only vehicular point of access between South Padre Island and the mainland. The existing causeway is a four-lane, 2.5 mile long bridge connecting Port Isabel to the southern end of South Padre Island. Due to high numbers of visitors to South Padre Island throughout the year, the existing causeway experiences severe congestion during peak periods. Traffic demand is found to be highest during the summer months and peaks during the spring break period. At such times, it can take several hours to cross the Queen Isabella Memorial Causeway. Congestion during these times can be exacerbated by traffic accidents on the bridge or other incidents that could result in the incapacitation of the Queen Isabella Memorial Causeway. The two most notable incidents occurred in 1994 and 2001.

In 1994, a small plane crashed into the causeway and forced its closure for several hours.

On September 15, 2001, four loaded barges crashed into one of the causeway's support columns. Three 80-foot sections of the bridge fell into the water leaving a large gap in the roadway. Eight deaths occurred as cars plunged off the damaged roadway into the Laguna Madre. The causeway was closed for two months while repairs were made. During the closure, state officials brought in ferries from Port Aransas and Galveston, Texas, to temporarily carry vehicles and pedestrians across the Laguna Madre. The collapse had a significant economic impact on the region. In recognition of the lives lost as a result of the 2001 tragedy, the causeway was renamed the Queen Isabella "Memorial" Causeway.

Although discussions regarding the construction of an alternative access to South Padre Island were initiated after the 1994 incident, to this day, the Queen Isabella Memorial Causeway remains the only vehicular access between South Padre Island and the mainland.

The following section provides information on the background and previous studies conducted to determine the need for a second access to South Padre Island.

1.1.1 Previous Actions and Studies

1.1.1.1 Section 1.29 of Texas Senate Bill 370 – Texas Transportation Institute Study, December 1998

Section 1.29 of Senate Bill 370, effective on September 1, 1997, directed TxDOT to complete a study of alternative routes for a second transportation link from the mainland to South Padre Island by April 30, 1998. Section 1.29 of Senate Bill 370, included as **Appendix A-1**, specified that the alternative access would provide the following:

1. An alternative for emergency ingress or egress for permanent residents and daily and overnight visitors;
2. Dispersion of traffic on the island to reduce congestion at the southern end of the island;
3. A reduction of travel time and cost by providing a more direct route to the island from upper Rio Grande Valley locations and provide relief to traffic congestion in municipalities along existing highway routes; and
4. Priority to environmentally friendly alternative options, such as a light-rail highway combination, that could be anchored at the Valley International Airport and the South Padre Convention Center or at other logistical destinations.

In response to Section 1.29 of Senate Bill 370, a South Padre Island Alternative Access Study was prepared by the Texas Transportation Institute (**Appendix A-2**) that identified potential crossing locations and evaluated the cost/benefit between a bridge alternative and a ferry service. The Texas Transportation Institute study identified five potential crossing locations:

1. An 8-mile crossing from Port Mansfield to South Padre Island;
2. A 7.6-mile crossing from Holly Beach northeast to South Padre Island;
3. An 8.5-mile crossing from Laguna Vista east-northeast to South Padre Island;
4. A 2.5-mile bridge adjacent to the existing Queen Isabella Memorial Causeway; and
5. A 0.7-mile crossing from Del Mar Beach to Isla Blanca Park.

None of the alternatives examined were considered cost effective based on operational benefits alone. The report concluded that consideration of economic benefits would be required for any alternatives to be considered cost effective.

1.1.1.2 South Padre Island Economic Development Corporation Feasibility Study, October 30, 2000

The South Padre Island Economic Development Corporation commissioned a second study to assess the feasibility of the 7.6-mile alternative connecting South Padre Island to Holly Beach as evaluated in the 1998 Texas Transportation Institute study. The South Padre Island Economic Development Corporation study (**Appendix A-3**) concluded that the proposed alternative would be most feasible if both the Queen Isabella Memorial Causeway and the proposed second access were tolled at one dollar. The study proposed a second alternative whereby the Queen Isabella Memorial Causeway would remain a non-tolled option and the proposed alternative would be tolled at two dollars. It was estimated that this alternative would require at least ten million dollars in additional funding from federal or state sources due to drivers' potential preference for non-tolled access to the island.

1.1.1.3 Texas House Bill 2616, May 17, 2001

On May 17, 2001, the 77th Texas Legislature passed House Bill 2616 which stated that the Texas Transportation Commission "may not convert the Queen Isabella Causeway in Cameron County to a turnpike project" and "may not transfer the Queen Isabella Causeway in Cameron County to an authority…" The May 17th, 2001 *House Journal*, which lists the passing of Texas House Bill 2616, is included as **Appendix A-4**. The intent of the legislation is to prevent the tolling of the existing roadway access to South Padre Island; the legislation would not apply to a second access to South Padre Island.

1.1.1.4 Queen Isabella Memorial Causeway Collapse, September 15, 2001

As previously stated, on September 15, 2001, the causeway was struck by a string of barges that damaged the support columns and caused several spans of the bridge to collapse. As a result, several vehicles plunged 85 feet into the waters of the Laguna Madre, causing eight deaths and requiring 13 water rescues. Thousands of tourists, workers and residents were left stranded on the island for two days as officials developed a plan to evacuate the island. Within days of the collapse, TxDOT established a temporary ferry system to transport residents and tourists between the mainland and South Padre Island.

TxDOT Pharr District personnel report an estimated average of 1.5 hours of additional trip time per bay crossing for those utilizing the temporary ferry system. Because all schools servicing South Padre Island residents are on the mainland, the daily home-to-school commute increased by approximately 3 hours during the period of time that the temporary ferry system operated.

The USCG conducted a formal investigation of the accident, which is included as **Appendix A-5**. After the 2001 tragedy, discussions regarding the development of a viable alternative access to the island were revitalized.

1.1.1.5 TxDOT Draft Environmental Impact Statement, 2003

In 2003, TxDOT initiated an environmental impact study (environmental impact statement) to document the environmental impacts of the construction of a second causeway between the mainland and South Padre Island. The study identified eleven alternatives, including the No-Build Alternative. The northernmost alternative in the TxDOT study was located in Port Mansfield, south of the Mansfield Cut. The southernmost alternative connected Brazos Island on the mainland and Isla Blanca Park on South Padre Island. In addition to six other route alternatives that spanned the Laguna Madre, the study included the evaluation of a sister bridge to the north of the Queen Isabella Memorial Causeway and the expansion of the existing causeway. Concerns expressed by the public during the 2003 study process included the potential negative economic impacts to Port Isabel and a possible alignment in the vicinity of Holly Beach. By 2003, the majority of the public comment indicated the Holly Beach location was their preferred location, mentioning the benefits such as congestion relief, safety and support of economic development on the island. Remaining concerns included negative impacts to the environment, cost impacts to lower economic groups and funding issues.

Due to a lack of local support for the project at the time, development of the project ceased in late 2003 and the draft environmental impact statement was not completed.

1.1.1.6 South Padre Island Second Causeway Preliminary Traffic and Revenue Study, Level 2, TxDOT, 2007

The purpose of the South Padre Island Second Causeway Preliminary Traffic and Revenue Study, Level 2 study was to evaluate the toll feasibility of a second access to South Padre Island (TxDOT 2007). A copy of this study is included in **Appendix A-6**. This study evaluated two tolling options (cash and electronic toll collection only) and two mainland terminus options (one 1 mile north of Port Isabel and the other one an extension of FM 510). Only one terminus was considered on South Padre Island (north of the Convention Center). Two travel demand models were used; one was developed based on a day with low travel demand, or a low amount of traffic and congestion and one for a high demand day. The models were calibrated and validated for 2006 and used to model traffic projections for the years 2017 and 2025. The study concluded that the FM 510 extension option would be advantageous in providing access and

promoting new growth and development. The study also concluded that allowing cash payment of tolls would potentially increase toll revenue by 52 percent when compared to electronic toll collection only.

1.1.1.7 Cameron County Regional Mobility Authority Strategic Plan, 2007-2011

In 2006, the CCRMA developed a strategic plan for development of regional solutions for improving the transportation infrastructure and economic development in Cameron County. The plan identified 14 projects (including the proposed 2nd Access Project); these 14 projects constitute the current network of facilities proposed for development by the CCRMA. A copy of the strategic plan is included in **Appendix C**.

1.1.1.8 Town of South Padre Island Comprehensive Plan, October 2008

The Town of South Padre Island completed the Town of South Padre Island Comprehensive Plan in 2008. One element of the plan addressed mobility issues on the island. Citing increasing traffic on the Queen Isabella Memorial Causeway and the barge accident in 2001, the plan proclaims the need for a new causeway to be more apparent than ever. The plan indicates the causeway would provide congestion relief for the Queen Isabella Memorial Causeway, improve hurricane evacuation and facilitate economic growth. A copy of the plan is included in **Appendix A-7**.

1.1.2 Consistency with Local Planning

Local planning documents prepared for the project area emphasize the need for increased mobility and economic development of the region. The proposed project is included in the *Town of South Padre Island, Texas, Comprehensive Plan* (Town of South Padre 2008) and the *Cameron County Regional Mobility Authority Strategic Plan, 2007-2011* (Cameron County Regional Mobility Authority 2006).

The proposed project is not located within an urbanized area or within the boundaries of a Metropolitan Planning Organization; therefore, it is not included in a Metropolitan Transportation Plan. Because the project is currently unfunded and planned for letting beyond the current Statewide Transportation Improvement Program timeframe, the project is not currently included in the FY 2008-2011 Statewide Transportation Improvement Program. However, it is anticipated that the proposed project would be included in a future Statewide Transportation Improvement Program.

1.2 NEED AND PURPOSE FOR THE PROPOSED PROJECT

As explained in the American Association of State Highway and Transportation Officials *Practitioner's Handbook: Defining the Purpose and Need and Determining the Range of Alternatives for Transportation Projects* (AASHTO 2007), federal regulations require every environmental impact statement to "briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." The need and purpose is the fundamental building block of any environmental impact statement and is a key factor in determining the range of alternatives considered in an environmental impact statement and, ultimately, the selection of the recommended alternative. The rationale for utilizing the need and purpose is that any alternative that does not meet the need and purpose of the project would eventually be rejected because it would not satisfy the needs that the project is intended to address.

The need for the proposed 2nd Access Project, which may also be viewed as the problem to be addressed by the proposed project, is the result of having only a single point of vehicular access to and from the island. This limited access restricts traffic flow during emergency evacuations, such as hurricanes, and limits options for medical transport from the island to hospitals and health care facilities on the mainland. Restricted access also limits the economic development potential of the area while contributing to elevated congestion levels and decreased mobility (on the island and between the island and the mainland). In the absence of a timely solution to address the transportation needs of the area, the issues will be further compounded as the population of the island and the adjacent areas increase in the future.

The draft need and purpose statement for the proposed 2nd Access Project was presented to the agencies and public at the first public scoping meeting in May 2008. As presented, the draft need and purpose statement included the following five distinct components:

- Improve Public Safety;
- Enhance Local and Regional Mobility;
- Provide the Infrastructure Necessary to Support Economic Development;
- Timely Implementation; and
- Environmental Sensitivity.

After receiving comments from agencies and the public, the five-component need and purpose (as outlined above) was approved by the FHWA and presented at the October/November 2008 agency and public scoping meetings.

It should be noted that during review/processing of the draft environmental impact statement it was determined that "timely implementation" is not a project need, but rather an FHWA goal with regard to all transportation improvement projects; the need and purpose was modified accordingly.

Although, as reflected subsequently in this document, timely implementation is no longer considered to be a project need, timely implementation remains an important objective of the proposed 2nd Access Project. Timely implementation of the proposed project is key to providing safe and efficient hurricane evacuation and improved emergency access; thus, minimizing the risk of loss of lives. Further, timely implementation is fundamental to achieving the mobility and economic development benefits of the proposed project; thus, improving quality of life in and around the project area.

Each (remaining) component of the modified need and purpose is addressed below.

1.2.1 Need for the Proposed Project

1.2.1.1 Improve Public Safety

There are safety concerns regarding a single point of access to and from the island. Emergency evacuation is an important safety and mobility issue for South Padre Island. The most obvious need for emergency evacuation would be in the event of a hurricane. South Padre Island is classified as a hurricane risk area 1 as shown in **Figure 1-1**. A hurricane bearing toward South Padre Island could require the evacuation of the entire island. Refer to **Exhibit 1-3** for hurricane evacuation routes within the study area.

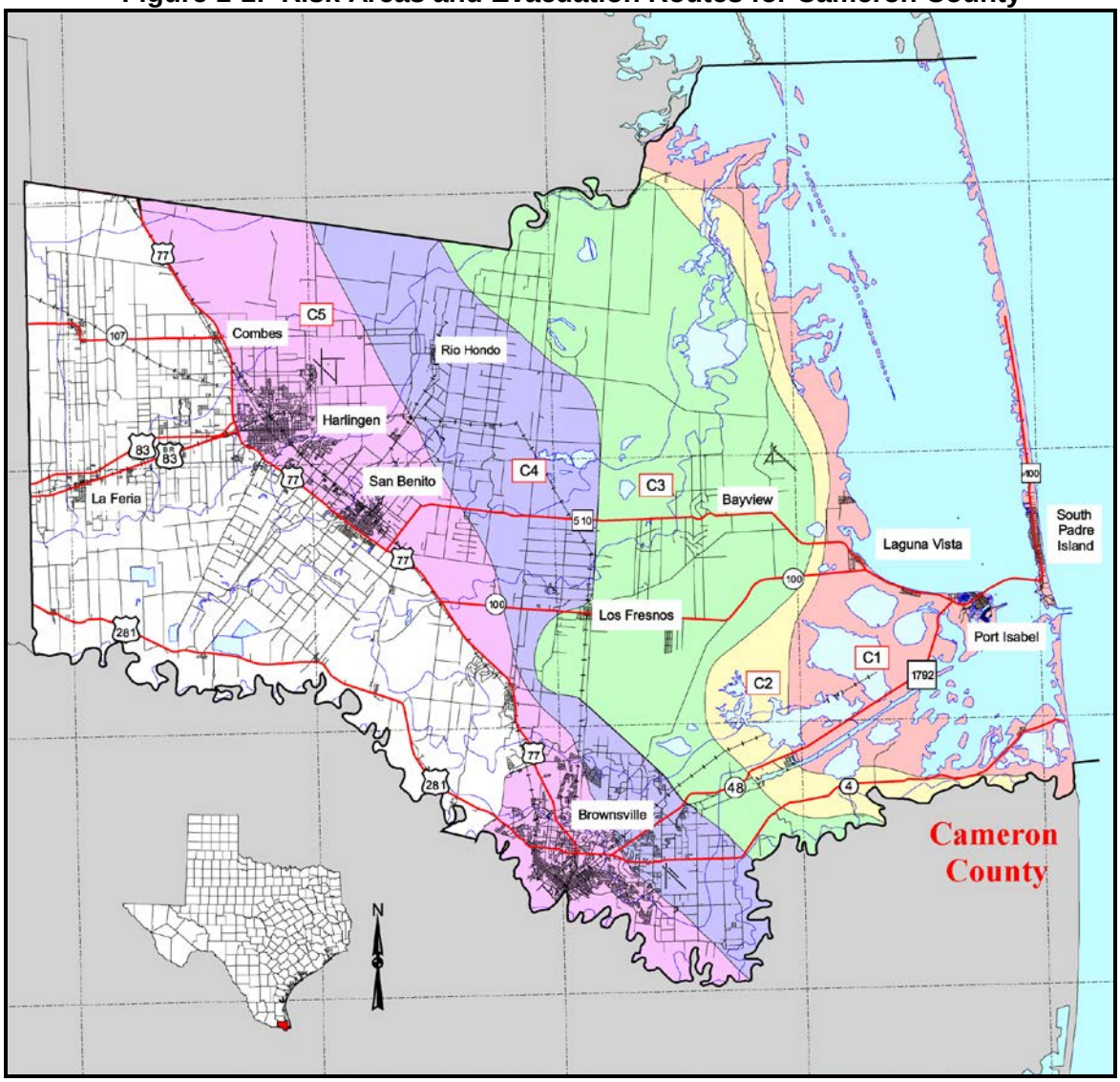
Historically, approximately one half of the hurricanes that have impacted the Texas gulf coast, formed in the gulf. Often gulf hurricanes form quickly (sometimes in less than twenty-four hours) and strike with little notice. These quick forming, hard hitting storms negate the ability of local public safety officials to plan and carry-out a safe and efficient evacuation of the island; thus, these events represent a public safety risk to tourists and island residents.

Statistics show that the South Padre Island area is affected by a hurricane or tropical storm every 4.21 years. The average number of years between direct storm hits is 7.32. From a statistical standpoint, South Padre Island is "due" for a storm before the end of 2013 (Hurricanecity.com 2010).

Before a Category 1 hurricane reaches the area, risk area 1 (which encompasses South Padre Island) would need to start evacuating roughly 15 hours prior to the hurricane arrival in order to evacuate the entire area as noted in **Table 1-1**. As the hurricane category increases, additional areas need to be evacuated; thus, extra time is needed to allow all individuals time to reach safety.

According to the 2002 hurricane evacuation study (Lindell, et al. 2002) included in **Appendix A-8**, it is assumed that a Category 1 hurricane would result in the evacuation of approximately half of the South Padre Island residents and all tourists. For each increasing category of hurricane, additional residents would evacuate. This would culminate with a complete evacuation of the island in the event of a Category 5 storm. It is likely that the existing causeway and any alternate access would require closure once conditions reached an unsafe level during a hurricane or storm event. However, it should be noted that the South Padre Island Emergency Management Team generally requires a complete mandatory evacuation of the area when a Category 2 or higher storm is predicted. Each of the reasonable alternatives (with the exception of the No-Build Alternative) would enhance hurricane/emergency evacuation of the island by providing an alternative route between the mainland and the island, and by providing numerous connections between the proposed facility and existing roadways/emergency evacuation routes such as FM 510, FM 2480, FM 106 and General Brant Road. These connections to existing roadways, which would occur between the termini of the proposed project, provide opportunities for evacuating traffic to exit the proposed facility and utilize the broader roadway network to reach evacuation destinations (rather than forcing all evacuating traffic through Port Isabel and existing bottlenecks within the city). All traffic evacuating the island would not be required to travel through a single point, as is the case today. A second access between the mainland and island would allow for expedited evacuation and would not concentrate all evacuating traffic to one travel corridor in Port Isabel.

Figure 1-1: Risk Areas and Evacuation Routes for Cameron County



Source: Cameron County Evacuation Map; Governor's Division of Emergency Management; (http://www.co.cameron.tx.us/emergency/docs/MAPHurricaneInterior.pdf)
Note: C1–C5 correspond to hurricane risk areas 1 through 5

Table 1-1: Texas Hurricane Risk Area Evacuation Times

Study Area	County	Hurricane Category	Evacuation Time (in hours)
Valley Study Area	Cameron	1	15
		2	21
		3	28
		4	32
		5	33
	Willacy	1	7
		2	7
		3	7
		4	8
		5	8

Source: Texas Hurricane Risk Area Evacuation Times; Governor's Division of Emergency Management; (http://www.co.cameron.tx.us/emergency/docs/MAPHurricaneInterior.pdf)

A second access to the island would also allow for an alternate route and provide for greater access to hospitals, doctors and other emergency personnel, especially during times of high traffic. During 2001, when the Queen Isabella Memorial Causeway was closed, residents and tourists had restricted access to the mainland and medical services. There are no hospitals on South Padre Island; thus, during the 2001 closure helicopters were the only effective means of transporting those in critical need of emergency medical care. This situation is repeated each time the existing causeway is closed. The nearest designated trauma facilities are Level III Advanced Trauma Facilities at Valley Regional Medical Center and Valley Baptist Medical Center in Brownsville, and Valley Baptist Medical Center in Harlingen (**Exhibit 1-4**). Currently, the normal travel time from South Padre Island to the facilities in Brownsville is approximately 40 minutes and 50 minutes to the facility in Harlingen. In the event of an accident or lane closure on the Queen Isabella Memorial Causeway or traffic congestion in Port Isabel, these times can be considerably longer (see Section 1.2.1.2 below). A second access to the island would provide greater accessibility to medical facilities by providing an additional route off the island, avoiding congestion on the Queen Isabella Memorial Causeway and in Port Isabel, and improving connectivity to mainland roadways such as SH 100, FM 510 and General Brant Road.

A second access to the island would also aide in the provision of more routine emergency services. According to the South Padre Island Fire Chief, the fire department has six fire fighters on immediate response that must be on the Island. All other volunteers must respond as needed; however, most of these volunteers live on the mainland and would need to use the Queen Isabella Memorial Causeway to report. In the case of any building structure fire, firefighters from Port Isabel and Laguna Vista are called in to assist. In the case of any multi-story structure fire, Brownsville and Los Fresnos are called in to assist. All of these assisting agencies must use the Queen Isabella Memorial Causeway to access the island.

Likewise, with medical response, there is one ambulance based on the island. The island-based ambulance works the first incident. Should subsequent calls be made for ambulance services, services are dispatched from Port Isabel, Laguna Vista, Los Fresnos and Brownsville, in that order. Accidents or lane closures on the existing causeway can severely impact emergency service response times from the mainland. During complete closures of the existing causeway, assistance from mainland-based emergency services is virtually cut-off – the only exception being air ambulance. It should be noted that currently there is only one air ambulance in the Rio Grande Valley that services South Padre Island. The approximate round trip time for this helicopter to carry one patient is 45 minutes.

1.2.1.2 Enhance Local and Regional Mobility

A need exists to enhance the mobility to and from the island and reduce the dependence on a single access point. The Queen Isabella Memorial Causeway can be shut down for hours due to traffic accidents or vehicle breakdowns. In addition, lane closures (not complete shutdowns) are required for maintenance activities.

There is no single, comprehensive source of closure data because two municipalities and several entities can be involved in a single closure event. Although not inclusive of every closure event, the South Padre Island Police Department provided information pertaining to closures occurring between May 26, 2008 and May 26, 2010, for which that department was involved with responding. During the two year period, South Padre Island police dispatch records document six closures of the causeway for various (non-traffic crash) reasons and 11 partial closures (involving one or more lanes) due to traffic crashes. The non-crash related full closures were in response to high winds (during Hurricane Dolly); an impact to a causeway pillar; a person hanging from the bridge railing; two people jumping from the bridge; and an activation of the causeway emergency system (cause unknown). In addition, the police department responded to 346 "assist motorist" calls due to disabled vehicles on the causeway blocking travel lanes.

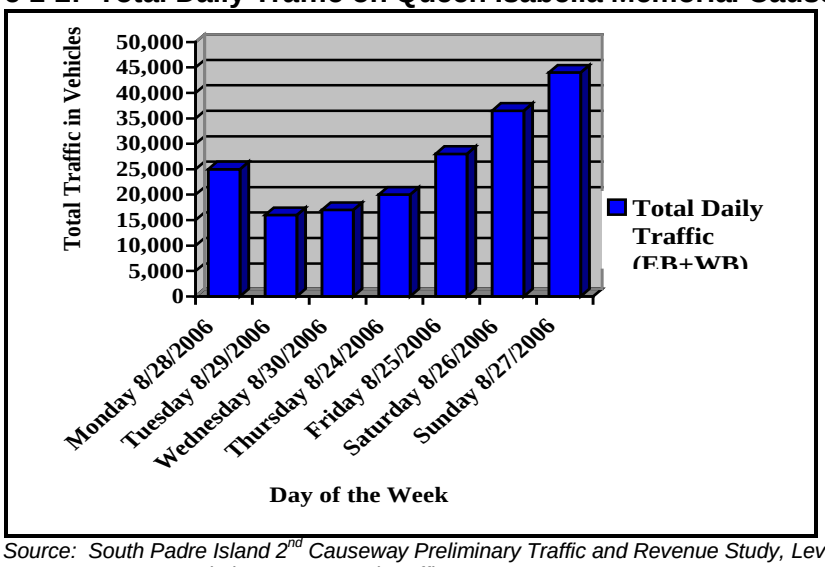
These events can limit, if not eliminate, access to or from the island. The proposed project would provide an alternate access as well as east-west connectivity within the region by providing connections to FM 510, SH 100 and Park Road 100. The proposed project would also provide improved connectivity to the local road network.

The roads leading to the Queen Isabella Memorial Causeway currently experience seasonal peak period congestion with stop and go traffic conditions starting at the intersection of SH 48 and SH 100 and extending to the causeway. Congestion is most frequently experienced during tourist season (spring break, summer and holiday weekends) and is a function of tourist traffic moving on and off the island.

Officials from South Padre Island, Port Isabel and Laguna Vista were surveyed to determine approximate travel times between the SH 100/FM 510 intersection and South Padre Island under various scenarios (**Appendix B**). According to surveyed officials, the trip takes from 20 to 25 minutes during the tourist off-season. This increases to 25 to 40 minutes on summer weekdays and 35 to 45 minutes on summer weekends. Holiday weekends experience greater travel times with trips requiring 50 to 70 minutes. During evacuations, the trip is estimated to take an average of 60 to 120 minutes. Traffic accidents create delays of an additional 10 to 20 minutes on a typical day and can create delays up to 3 hours on holidays and other peak season weekends.

Traffic patterns derived from counts obtained during one week in August 2006 are presented in **Figure 1-2** to indicate the traffic volume patterns during a typical tourist season week. It should be noted that the dates of the study were conducted close to the Labor Day holiday, which attracts more tourists to the island (TxDOT 2007). The data for this week indicates that traffic volumes on the Queen Isabella Memorial Causeway peaked on Friday, Saturday, Sunday and Monday.

Figure 1-2: Total Daily Traffic on Queen Isabella Memorial Causeway

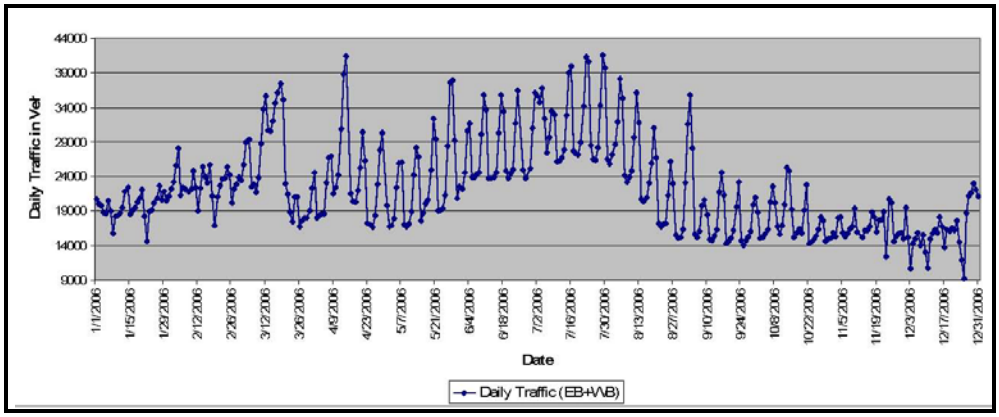


Source: South Padre Island 2nd Causeway Preliminary Traffic and Revenue Study, Level 2 (TxDOT 2007)
EB+WD = East Bound plus West Bound Traffic

Daily traffic data collected throughout 2006, revealed a similar pattern and one that is typical of tourist areas: traffic is the heaviest during the weekends and higher during holidays and the summer months. Through the week, consistent traffic patterns are observed Tuesday through Friday, while Mondays exhibit an individual pattern.

As shown in **Figure 1-3**, 2006 daily traffic counts on the Queen Isabella Memorial Causeway were lower from January through early March and from mid-August to the end of the year. Traffic volumes were impaired on the weekends from mid-April to late-June and during August; however, traffic volumes during the week were acceptable. The daily traffic graph clearly shows peaks where traffic volume well exceeds 25,000 vehicles per day which can be attributed to holidays and the tourist season: Spring Break, Easter weekend, Memorial Day weekend, July (peak tourist season), and the last peak, Labor Day weekend. All of these dates correlate with daily traffic volumes between 25,000 and 41,540 vehicles per day. Although data is for a single year, given the tourist-based economy, similar patterns would be expected from year-to-year. Unlike typical peak period congestion patterns, peak traffic periods experienced within the study area are attributable to tourism-related trips rather than daily commuting.

Figure 1-3: Daily Traffic on Queen Isabella Memorial Causeway in 2006



Source: South Padre Island 2nd Causeway Preliminary Traffic and Revenue Study, Level 2 (TxDOT 2007)

Table 1-2 presents the Average Annual Daily Traffic (AADT) for four locations within the study area. These locations show a general annual growth, which ranges from approximately 0.15 percent on SH 100 west of FM 510 to 3.48 percent on FM 510 west of SH 100.

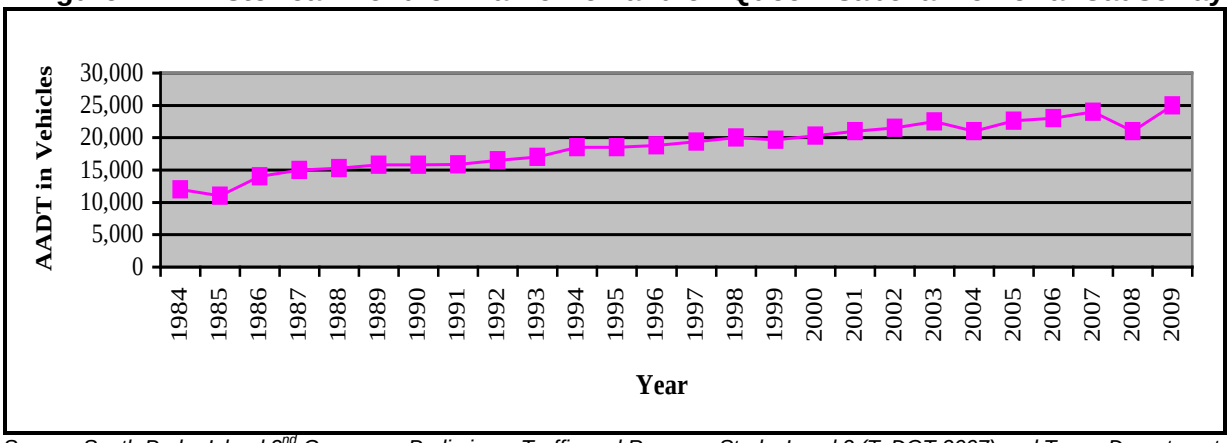
Table 1-2: Historical Traffic

Description	2001 AADT	2002 AADT	2003 AADT	2004 AADT	2005 AADT	2006 AADT	2007 AADT	2008 AADT	2009 AADT	Average Annual Growth 2001-2009 (percent)
Queen Isabella Memorial Causeway	21,000	23,000	21,462	20,613	21,666	22,064	24,000	21,000	25,000	2.64
SH 48 South of SH 100	5,900	5,800	6,700	7,000	6,650	N/A	6,800	7,000	6,500	1.52
SH 100 West of FM 510	8,200	7,600	7,300	8,100	8,180	N/A	9,100	7,400	8,800	0.15
FM 510 North of SH 100	5,100	5,500	7,000	6,200	6,440	N/A	7,200	6,500	6,700	3.48

Source: C&M Associates, Inc and Texas Department of Transportation.

Displayed graphically below in **Figure 1-4** is the historic traffic demand on Queen Isabella Memorial Causeway. As shown, traffic demands have steadily increased over the past 22 years. In 2009, the Queen Isabella Memorial Causeway carried an average of approximately 25,000 vehicles per day.

Figure 1-4: Historical Trend of Traffic Demand on Queen Isabella Memorial Causeway



Source: South Padre Island 2nd Causeway Preliminary Traffic and Revenue Study, Level 2 (TxDOT 2007) and Texas Department of Transportation

Level of service is a qualitative measure of operating conditions based on control delay. Generally level of service is given a letter designation from A to F, where level of service A represents free-flow conditions and level of service F represents heavy congestion. Level of service can also be compared to level of mobility which rates service from "tolerable to severe." According to the Pharr District of the Texas Department of Transportation, the Queen Isabella Memorial Causeway currently operates at level of service C to D with average daily traffic of 21,000 vehicles. Average daily traffic volumes are anticipated to increase approximately 40 percent to 36,600 in the year 2036. Over time, this increase in traffic would further reduce level of service on the existing causeway, creating volatile operating conditions, limiting ability to maneuver within the traffic stream and increasing breakdowns in the vehicular flow.

There is a need to provide sufficient highway capacity improvements, which can provide increased people and goods-carrying capacity in the project area. This need can be attributed to the rapidly growing population in and around the project area and the increasing tourist activity. According to the Texas State Data Center, during the 25-year period from 2000 through 2025, Cameron County's population is expected to increase from 335,227 in 2000 to approximately 542,338 in 2025. This projection for Cameron County results in a population growth of approximately 61.7 percent.

The projected population growth combined with traffic generated through tourism would increase demand along the Queen Isabella Memorial Causeway. Traffic along SH 100 and on the Queen Isabella Memorial Causeway is projected to be 36,600 vehicles per day in 2036, which is an increase of approximately 74 percent over existing conditions.

1.2.1.3 Provide the Infrastructure Necessary to Support Economic Development

State and local leaders have developed a vision for South Padre Island and the south Texas region that has been documented in local development plans prepared by Laguna Vista, Port Isabel, South Padre Island, Harlingen, Brownsville and others. This vision is centered on the expansion of the area as a national and international tourist destination with a focus on becoming a major nature and birding center. The region encompasses a diversity of wildlife and habitats that will be protected on public land for the foreseeable future. These natural resources are a valuable asset to the communities and provide a reason for tourists, winter residents and/or businesses to visit and/or relocate to the area. However, development must be carried out in such a manner as to protect the natural assets of the area while providing the infrastructure necessary to capitalize on the opportunities.

A safe and efficient transportation infrastructure system is crucial to establishing, maintaining and growing a healthy economy. Within the study area, the transportation infrastructure system is inadequate as evidenced by the safety and mobility needs addressed in **Section 1.2.1.1** and **1.2.1.2**. The lack of adequate transportation infrastructure compromises the economic viability of the area by hindering access to local tourist attractions and destination points, which in turn limits development potential of the study area and the region. As discussed in the Proposed South Padre Island Second Access Economic Analysis, an alternative access would provide new access to undeveloped land in the northern portions of the study area that have not developed, in part, due to a lack of accessibility and infrastructure within the region (TXP 2009). A copy of this study is included in **Appendix G**.

Although new development could potentially result in a small decrease in the availability of natural areas, it would provide the infrastructure needed to meet local planning goals for ecotourism. Additionally, increased access on and off South Padre Island would further increase the opportunity for South Padre Island to serve as a base from which to visit internationally known birding sites on protected lands throughout the Rio Grande Valley on a series of day trips, as well as increase opportunities for development of the communities on the mainland. Currently, the major shopping resource is in Port Isabel, which serves the residents of Laguna Heights and Laguna Vista, as well as tourists visiting the area.

Stakeholders and local officials were interviewed during the course of the economic analysis prepared in conjunction with this environmental impact statement. Many interviewees identified congestion during peak tourist periods and lack of infrastructure as key issues limiting economic development on the island. Interviewees confirmed that a second access would provide an alternate/more efficient route for some traffic, increase the labor pool "drawing area" (which

includes Brownsville, Port Isabel, Laguna Vista, Laguna Heights and Harlingen) and shorten commute times to the northern end of the island - all of which would serve to enhance development potential in the northern portion of the study area.

1.2.1.4 Environmental Sensitivity

The project area is environmentally sensitive. Within the study area, there are wildlife sanctuaries, coastal preserves, national wildlife refuges and colonial waterbird rookery areas. The most notable of these is the Laguna Atascosa National Wildlife Refuge, which is home to 13 confirmed resident ocelots, an endangered species. The South Padre Island Birding and Nature Center is also located within the study area.

Sensitive species associated with the Texas Gulf Coast area include marine, estuarine and terrestrial species such as sea turtles, the Northern Aplomado Falcon and Piping Plover. In addition, several rare and endangered plants such as Vasey's adelia, star cactus, Texas ayenia, Runyon's cory cactus, Green Island echeandia, Runyon's water-willow and Shinner's rocket are found nowhere else except the South Texas Gulf Coast and Lower Rio Grande Valley area.

South Padre Island is an important migratory bird fallout area for trans-gulf migratory birds from southern Mexico and Central America. The island is a landfall for these neotropical and nearctic birds and provides critical resting and feeding habitats. The Laguna Madre is located in between the mainland and South Padre Island and is a hypersaline lagoon (saltier than the ocean). It is one of only six known hypersaline lagoons on earth. The Laguna Madre is an important breeding ground for many aquatic birds, and acts as a wintering and stopover area for numerous species.

Seagrasses within the Laguna Madre provide habitat for threatened and endangered sea turtles and provide nursery habitat for many commercially and recreationally valuable aquatic species. The extremely shallow seagrass areas also provide excellent feeding grounds for winter duck populations. The extremely shallow seagrass areas also provide excellent feeding grounds for wintering red-headed ducks; the Laguna Madre is the largest red-headed duck wintering area in the world (80% of the population winter here). In the summer months, the Laguna Madre acts as a nursery area for young brown shrimp.

The tourist-based economy of the study area relies heavily on natural environmental features to attract visitors to the area. Protection of the area's natural environmental resources is critical in order to preserve the long term economic vitality of the area. According to a 2011 study done by South Texas Nature Marketing Coop, the total annual expenditures by visitors in the valley who come specifically to bird or for other watchable wildlife activities spend approximately $300 million per year.

1.2.2 Purpose of the Proposed Project

The purpose of the proposed 2nd Access Project is to facilitate congestion management during peak travel periods and emergency evacuations, enhance safety and mobility (both locally and regionally), provide the infrastructure necessary to support economic development, and to deliver the much needed transportation system improvements in an environmentally sensitive manner.

The importance of this purpose is underscored by the September 15, 2001 collapse of several spans the Queen Isabella Memorial Causeway. This accident disabled the sole vehicular access to South Padre Island; therefore, the island was isolated for several days until a ferry

could be established to transport residents and tourists between the mainland and South Padre Island.

CHAPTER 2

ALTERNATIVES

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ALTERNATIVES

2.1 SUMMARY OF ALTERNATIVES DEVELOPMENT PROCESS

The alternatives development process for the proposed 2nd Access Project occurred in six distinct phases. Each of these phases is summarized below and described in this chapter.

- Phase I - identified a universe of alternatives
- Phase II - narrowed the universe of alternatives to a field of preliminary alternatives based on a fatal flaw analysis
- Phase III - involved a screening process applied to the preliminary alternatives resulting in the identification of the reasonable alternatives
- Phase IV - modal evaluation
- Phase V - allowed for the refinement of the reasonable alternatives in order to avoid and/or minimize impacts
- Phase VI - identification of the recommended preferred alternative.

The modal options considered were rail transit, ferry system, roadway (tunnel) and roadway (bridge). Additionally, this chapter examines other potential strategies for meeting the project's need and purpose, such as high occupancy vehicle lanes, bus transit, bicycle and pedestrian lanes, traffic demand management and traffic system management.

Scoping for the proposed 2nd Access Project included a series of three public scoping meetings and an agency scoping meeting. The public scoping meetings were held at strategic milestones in the project development process and each meeting focused on a specific aspect of the alternatives development process. Public scoping meetings were held on May 22, 2008; November 6, 2008; and February 6, 2009. An agency scoping meeting was held on May 22, 2008.

At Public Scoping Meeting #1, the draft project coordination plan and the draft need and purpose were presented to the public for review and comment (see additional discussion in Chapter 1, Section 1.2). At Public Scoping Meeting #2, the project team presented and solicited public comment on the universe of alternatives, preliminary alternatives and the screening process used to identify the preliminary alternatives. At this public scoping meeting, the draft reasonable alternative evaluation criteria were also presented for public comment. At Public Scoping Meeting #3, the results of the preliminary alternative to reasonable alternative evaluation process were presented and public input was solicited.

To further facilitate and encourage public engagement in the project development process, a series of context sensitive solution workshops were also conducted from October 2008 to September 2009.

Five technical working groups were formed to aide in guiding the project development process. Each working group represented a specific area of technical expertise. The technical working groups consisted of the Public Involvement Technical Working Group, the Economic Development Technical Working Group, the Engineering Technical Working Group, the NEPA Technical Working Group, and the Funding Technical Working Group. The group meetings occurred from April 2008 to October 2009.

The environmental analysis and alternatives analysis development was conducted thoroughly and systematically considering resource and constraints mapping, environmental issues, traffic, engineering, and public involvement. This process enabled the reviewers to compare and evaluate alternatives through an iterative series of evaluation criteria phases. It also provided the basis to select a single recommended alternative that best serves the project's need and purpose and avoids or minimizes environmental impacts.

The identification of the recommended alternative in this draft environmental impact statement was consistent with the guidelines and regulations that were set forth by FHWA and the Council on Environmental Quality (23 CFR 771.223, 40 CFR 1502 and FHWA, 1987). The multi-step development process also meets various requirements of the National Environmental Policy Act (NEPA); 23 USC Section 139 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users; and Section 404 permit process. The approach first emphasized total avoidance of such impacts, and then minimization of such impacts in unavoidable situations.

In addition to public comments, input was also obtained from agencies including the U.S. Fish and Wildlife Service (USFWS), the U.S. Army Corps of Engineers (USACE) and the National Ocean and Atmospheric Administration Fisheries Service (NOAA Fisheries), the U.S. Coast Guard, the Texas General Land Office, the Texas Parks and Wildlife Department (TPWD), the Texas Historical Commission (THC), and the Texas Commission on Environmental Quality (TCEQ). Useful information was received relating to:

- Location of potential habitat for protected species
- Seagrass beds
- Potential migration strategies

2.1.1 Phase I – Identification of Universe of (Bay Crossing) Alternatives

The "universe" of alternatives consisted of 46 possible bay crossing of the Laguna Madre, each of which included a roadway connection to Park Road 100 on the island and the No-Build Alternative for a total of 47 bay crossing alternatives. Included within the 46 possible bay crossings is the "sister bridge" concept (which would locate the proposed 2nd Access Project adjacent to the existing Queen Isabella Memorial Causeway) and the option to widen the existing causeway. It also included a ferry alternative. Refer to **Exhibit 2-1** for a depiction of the universe of alternatives.

The universe of alternatives included:

- Alternatives identified during the 2003 environmental study/environmental impact statement (eight alternatives);
- Alternatives suggested by attendees of the May 22, 2008 public scoping meeting (nine alternatives);
- Additional alternative identified by the current project planning team (29 alternatives); and the
- No-Build Alternative.

2.1.2 Phase II – Identification of Preliminary (Bay Crossing) Alternatives

Once the universe of bay crossing alternatives was identified, the next phase of the alternative development process was to narrow the universe of alternatives to the field of preliminary alternatives. This was accomplished through a fatal flaw analysis and identifying/eliminating

"redundant" alternatives. Alternatives with similar mainland and island termini were considered redundant if there were no advantages or disadvantages when compared one to the other. In the case of groups of redundant alternatives, a single representative alternative was carried forward.

For purposes of the screening efforts, direct impacts to any of the following were considered to be fatal flaws:

- Publicly-owned parks and recreational areas (most notably: Isla Blanca Park and Andy Bowie Park);
- Wildlife or waterfowl refuges of national, state or local significance (Laguna Atascosa National Wildlife Refuge and the Lower Rio Grande Valley National Wildlife Refuge);
- Designated Coastal Barrier Resources Act lands; and
- Properties listed on the National Register of Historic Places.

In total, eight of the 46 bay crossing alternatives were determined to be fatally flawed and were eliminated from consideration. The remaining alternatives were then screened for redundancy. A total of 18 bay crossing alternatives were considered redundant and eliminated from consideration.

The 20 bay crossing alternatives not eliminated through the above-described fatal flaw or redundancy screenings and the No-Build Alternative were carried forward as preliminary alternatives. The preliminary bay crossing alternatives are shown in **Exhibit 2-2**.

2.1.3 Phase III – Identification of Reasonable Alternatives

Phase III involved several steps, beginning with the identification of mainland location options. Whenever possible, mainland options were routed along existing publicly-owned rights-of-way (ROW); thereby, minimizing the impacts associated with the conversion of lands to transportation use. The mainland options are identified as Options A, B, C and D on **Exhibit 2-3**. The mainland options, when combined with the bay crossing alternatives, result in complete end-to-end alternatives providing connectivity between the project points of termini (State Highway [SH] 100 and Park Road 100).

In order to systematically evaluate the end-to-end preliminary alternatives, evaluation criteria were established. A specific effort was made to develop the criteria in a manner that provided a binary response. By providing a "meets" or "fails to meet" response to each category, responses that fall into an intermediate "gray" area would be avoided; thus, minimizing the degree of subjectivity in the process. In addition, this binary response system avoids the issue of establishing an arbitrary standard for meeting the criteria.

The evaluation criteria were based on each of the primary components of the project's need and purpose statement and are shown in **Table 2-1**. For each major category of the need and purpose, one or more corresponding criteria were developed. For each criterion a more specific performance measurement was also developed.

After presenting the evaluation criteria to the public and resource agencies for comment, the evaluation criteria were applied to the preliminary end-to-end alternatives in order to narrow the field of possible alternatives to only the most reasonable. End-to-end alternatives that failed to satisfy the evaluation criteria were eliminated due to inability to satisfy the established purpose

of the project. It should be noted that often alternatives were eliminated due to failure to satisfy more than one criterion.

The alternatives evaluation process led to the identification of 11 end-to-end alternatives (combinations of bay crossings 1, 2, 3, 4 and 5 and mainland options A, B, C and D show on **Exhibit 2-3**) that were determined to satisfy the project need and, thus, were carried forward as reasonable alternatives. **Exhibit 2-4** shows the end-to-end alternatives.

Table 2-1: Need and Purpose Based Evaluation Criteria

Need and Purpose	Criteria	Measurement of Criteria
Improve Public Safety	Provides emergency evacuation route	Provide access to other emergency evacuation routes as defined by the Texas Department of Public Safety.
	Provides emergency response route	Provide a method that allows improved access for emergency vehicles.
Enhance Local and Regional Mobility	Provides alternative route to South Padre Island	Provide access to South Padre Island in the event the Queen Isabella Memorial Causeway was closed to traffic.
	East-West system connectivity in area	Provide access to primary east-west traffic corridors in the study area.
Provide the Infrastructure Necessary to Support Economic Development	Supports existing economic development	Provides access to existing communities and businesses on the mainland and South Padre Island.
	Consistent with local development plans	Provides access to future communities and businesses on the mainland and South Padre Island. Results in positive local and regional economic impacts relating to construction activities, land use plans and property tax base.
	Consistent with regional development plans	Consistent with regional transportation and development plans
Environmental Sensitivity	Minimizes impacts to mainland development	Would not require major displacements of developed properties
	Minimizes impacts to South Padre Island development	Would not require major displacements of developed properties
	Impacts to wildlife refuges, historic areas, parks, etc.	Does not impact known wildlife refuges, historic areas, parks, etc.
	Maintain a valuable fishery in the area	Minimizes impacts on essential fish habitat within the Laguna Madre.
	Maintain biodiversity habitat in support and enhancement of the local ecotourism industry	Minimizes impacts to threatened and endangered species habitat.
	Public input	Input from public meetings is incorporated.

Note: The need and purpose/criteria/performance measures shown here reflect modifications to the need and purpose occurring after the public scoping process (see explanation in Chapter 1, Section 1.2). However, the modifications did not alter the results of the alternatives evaluation process.

2.2 PHASE IV - MODAL EVALUATION

In addition to the development of alternative alignments, four modal options were analyzed: rail transit, ferry system, roadway (tunnel) and roadway (bridge). Within this section, these transportation types are evaluated for their ability to meet the need and purpose of the project.

In order to compare the different modes, a representative 7.5-mile long crossing of the Laguna Madre was assumed. The cost estimates and general environmental impacts discussed below are based on this representative crossing. The projected “order of magnitude” costs included in the analysis are based on costs the project team has experienced on similar types of projects

(bridges and tunnels) and on costs in other similar operations in Texas (ferry). The detailed engineering necessary to develop a more precise cost estimate was not performed for this analysis. For purposes of modal evaluation, it is assumed that impacts would occur across the entire length of the crossing. The areal extent would vary by mode type and the ROW/easement requirements. In addition to the impacts assumed to occur within the ROW/easement, temporary construction impacts would also be anticipated. Temporary impacts would vary by construction method; thus, it is not possible to accurately quantify temporary impacts at this time.

With the stated need and purpose of the project as a basis, how each of the four modal types addresses each of the following five questions was considered:

- Does it improve public safety?
- Does it enhance local and regional mobility?
- Does it support economic development?
- Does it facilitate peak period congestion management (by offering an alternative route)?
- Can it be accomplished in an environmentally sensitive manner?

2.2.1 Rail Transit

Rail transit refers to any transit service that uses exclusive or controlled rails. The term includes heavy rail, commuter rail, light rail, trolleybus, aerial tramway, inclined plane, cable car, or automated guideway transit. For purposes of this modal evaluation, a light rail transit line is assumed. The light rail transit line would originate on the mainland near SH 100, would cross the Laguna Madre and terminate on South Padre Island.

The construction costs of rail transit lines vary widely with the median cost near $35 million to $45 million per mile. However, since the rail transit mode for the 2nd Access would require crossing the Laguna Madre on a structure, its construction costs would be similar to the construction costs of the roadway bridge – in a range from $350 million to $500 million. Similar to construction costs, the operations costs for light rail vary greatly for systems throughout the United States. For this modal evaluation, an additional $10 million to $12 million per year is assumed to be required to operate the transit line.

The following is the evaluation of the rail transit mode relative to the purpose of the project:

<u>Does rail transit improve public safety?</u>
The rail transit system would have several limitations to effective use during emergencies. Without connectivity to an existing rail system on the mainland, the proposed rail transit would require an additional transit system, such as bus service, to move people quickly from the terminus on the mainland to emergency shelters or other services making this alternative a significant challenge for emergency evacuation purposes. Further, the rail transit system would be limited in the number of people it could transport in an evacuation by the number of tracks, engines and rail cars in service making this alternative relatively ineffective for emergency evacuation purposes. Additionally, emergency service providers are unlikely to utilize the rail transit mode for transport of patients to hospitals or other service facilities in the event of an emergency. The rail transit mode would offer limited improvement to public safety.

<u>Does rail transit enhance local and regional mobility?</u>
The rail transit mode under the currently defined project is limited to only a local mobility enhancement because there would be no connections to a regional rail system. In order for rail

transit to be a viable regional mobility enhancement, connection to an existing or proposed rail system network would be needed. There are no current plans or projects identified for rail expansion within the region. It should be noted that the *Brownsville Comprehensive Plan* (City of Brownsville 2009) identifies a corridor from Brownsville to South Padre Island, along SH 48, as a route or area that may warrant further study for transit applications and that specific studies should be conducted to determine the preferred infrastructure, but makes no commitments on funding, schedule, or the feasibility of a transit mode.

The local mobility aspect of the rail transit mode would be limited to enhance movement between the western terminus of the rail project in the Holly Beach/Laguna Vista area to the eastern terminus of the rail project on South Padre Island. Without the connection to another rail system, rail transit riders would need to find alternative transportation modes, such as a personal vehicle, to get to and from the station stops. This would be inconvenient to the rider and would increase travel time. Similarly, for the traveler coming from the mainland to South Padre Island a secondary travel mode (bus, taxi, etc.) would be required to get people to their South Padre Island destinations. The rail transit mode would offer limited improvement to local and regional mobility.

Does rail transit support economic development?
The rail transit alternative would have fixed infrastructure in place with the potential to support economic development. While a positive economic impact may be assumed for the area immediately surrounding the rail transit stations, even if strong ridership developed for this mode, areas of greater distance from the stations would require other transportation modes (public and private) to support economic development. Without the presence of a more comprehensive system, the rail transit mode would offer limited improvement to economic development.

Does rail transit facilitate peak period congestion management (by offering an alternate route)?
The rail transit alternative does offer an alternate route. To reduce congestion during peak travel periods using the rail transit alternative, travel behavior would need to be modified from using private vehicles to using public transit. To do this, the public transit needs to be quick, convenient, reliable and cost effective. However, there are significant challenges to achieving this with rail transit on the 2nd Access Project. As an isolated rail line, the lack of connectivity to an existing or planned rail network creates a rail transit system that would have limited usage within the region. Additionally, the mainland to the west of South Padre Island is primarily a rural decentralized setting making it difficult to locate effective station stops. The rail transit mode would offer limited improvement to peak period congestion.

Can rail transit be accomplished in an environmentally sensitive manner?
While a double-track rail only structure crossing the Laguna Madre would not require the same width as the proposed roadway structure, its construction impacts to the seagrasses and other elements of the aquatic environment would be similar. The area of direct impact of the railway (bridge) option may range from less than one acre to over 125 acres depending on the method of construction. Depending on the method of construction the bridge may require the dredging of a temporary channel approximately 12 feet deep to allow for maneuverability of construction barges and other equipment. This channel could be up to 140 feet in width. This could result in the removal of up to approximately 2.5 million cubic yards of material from the Laguna Madre. Since the dredge area would be restored to original grades and soil strata following construction, its impacts would be temporary. The area disturbed during construction and the associated environmental impacts with this modal option may vary depending on chosen method of construction.

2.2.2 Ferry System

When the Queen Isabella Memorial Causeway was damaged in September 2001, ferries were used as the only means of transportation to the mainland. However, there is no ferry system currently operating in the vicinity of the South Padre Island 2nd Access Project; therefore, data gathered from the Galveston-Port Bolivar ferry system operated by the Texas Department of Transportation (TxDOT) contributed to this evaluation. It is assumed the ferry system would consist of large, self-propelled water vessels capable of transporting people and automobiles across the Laguna Madre from the mainland to South Padre Island. The ferry system would require at least two terminal facilities and would need to have multiple landings at each terminal and multiple vessels in operation to maintain adequate service to the public.

The initial costs for a fleet of five ferries capable of transporting 70 vehicles each would be approximately $110 million. This fleet could move 350 vehicles per hour based on loading, waiting and travel times. Annual operating costs of the ferry system could range from $20 million to $25 million. These estimates do not include any costs associated with the construction of ferry landings or other landside support systems. These costs are based on current costs experienced by the ferry system operating between Galveston Island and the Bolivar Peninsula.

Maintaining a fleet of ferries to move as many people as could be accommodated by road or rail would be unrealistic and cost prohibitive. Sixty-four ferries would be necessary to move the peak hour capacity of a 4-lane bridge or tunnel during an evacuation situation (4,500 vehicles per hour) – that would equate to $1.44 billion (assumes 64 ferries at $22.5 million per ferry) in capital costs alone based on capital costs experienced by the Galveston-Bolivar Ferry.

The following is the evaluation of the ferry mode relative to the purpose of the project:

Does a ferry system improve public safety?
The ferry system alternative would have several major limitations to be effectively used during emergencies, such as a South Padre Island evacuation. The ferry system would be limited in the number of people it could transport during an evacuation by the number of ferries in service and the amount of cars and passengers that each ferry could transport. Using equipment similar to the Galveston-Bolivar Ferry, each ferry would have the capacity of 70 cars. Further, the ferry system will be interrupted when severe weather is present, including: hurricane weather, 50–55 miles per hour sustained winds, or intense fog. Finally, the ferry system may also be interrupted by Intracoastal Waterway channel traffic or if Intracoastal Waterway traffic slows due to severe weather. The ferry option would have limited improvement for public safety.

Does a ferry system enhance local and regional mobility?
The ferry alternative would offer an alternate mode of transportation and an alternate access to the island to enhance local mobility. It would provide an additional access to South Padre Island, and the connections to the existing roadway system with a similar transportation type facility would allow ultimate flexibility for the users of the facility. However, the potential ridership of the ferry system could be limited by the added travel time and inconvenience of riding a ferry relative to traversing the existing Queen Isabella Memorial Causeway. Based on wait, loading/unloading, and transport times of the Galveston-Bolivar Ferry operation, it is estimated that the travel time of the ferry alternative would be approximately 75 minutes. This includes an average wait time of 18 minutes, nine minutes for loading/unloading, and 48 minutes for the trip across the Laguna Madre. These limitations could render the ferry

ineffective at significantly enhancing even local mobility; a ferry system serving South Padre Island would have limited measurable impact enhancing regional mobility.

Does a ferry system support economic development?
Economic development would be expected in the vicinity of the ferry terminal sites. The ferry's ability to transport automobiles could support economic development similar to that of a bridge or tunnel option to due improved access; however, the effectiveness and efficiency of this mode type to support economic development faces the constraints due to the same limitations on potential ridership stated above. The ferry option would have a limited affect on area economic development.

Does a ferry system facilitate peak period congestion management (by offering an alternate route)?
A ferry system would offer an alternate route, but would not have a significant effect on peak period congestion because of the limited number vehicles that could be transported – 70 per ferry and the average trip time – 75 minutes. As stated under the rail transit mode, to reduce congestion during the peak period through implementation of a ferry system, travel behavior would need to be modified. The traveler would need to be persuaded from crossing the existing bridge to using the ferry system. The ferry system would need to be quick, convenient, reliable and cost effective for the user - all of which are significant challenges when directly competing with a bridge crossing. Only in extreme peak congestion periods – delays approaching 70 minutes, would a ferry system be able to provide a quicker crossing than the existing Queen Isabella Memorial Causeway - assuming no congestion at the ferry. Yet even in this situation, the ferry system would not likely provide enough capacity to significantly reduce congestion on the Queen Isabella Memorial Causeway or the area roadways.

Can a ferry system be accomplished in an environmentally sensitive manner?
Development of a ferry system in an environmentally sensitive manner would be challenging. Besides the initial dredging of a channel for the ferry to operate, maintenance dredging on a regular basis would be required. As a reference, the Galveston-Bolivar Ferry dredges its channel twice a year. Because on-going dredging would impede re-establishment of natural conditions, the impact on natural resources would be permanent. Since dredging is one of the main threats to seagrasses, this alternative has the potential to cause extensive, adverse and permanent impacts to that natural resource.

To safely accommodate two ferries running simultaneously in opposing directions, a channel of at least 160 feet in width and 20 feet in depth would need to be dredged and maintained. The initial dredging would require the removal of approximately 4.7 million cubic yards of sediment from the Laguna Madre. The dredge channel would permanently impact approximately 145 acres of the Laguna Madre. The ferry option would have direct impacts on the environment during both construction and ongoing operation of the system.

2.2.3 Roadway (Tunnel)

A roadway (tunnel) option could be implemented in a number of ways. For this study, a roadway (tunnel) transportation type would provide conveyance of automotive vehicles (car, trucks, buses, recreational vehicles, etc.) across the Laguna Madre, with all or a portion of the roadway submerged beneath the water level and the Gulf Intracoastal Waterway. One option would be for the tunnel to completely traverse the Laguna Madre with portals near the existing island and mainland. Another option would be to utilize a bridge-tunnel combination where the majority of the roadway would be on bridge structure with man-made portal islands and a tunnel

section under the Gulf Intracoastal Waterway only. The chief advantage of the full-length tunnel option is that once constructed, the tunnel would minimize interference with the natural currents in the Laguna Madre and the Gulf Intracoastal Waterway.

The tunnel option would be subject to a high construction cost and significant disruption to the ecosystem due to the method of construction. Based on past experience with tunnel projects, the project team estimated the tunnel would cost $30,000 per lane/foot, resulting in a construction cost of approximately $4.8 billion. The shallow water depth and geologic conditions of the Laguna Madre are not conducive to tunnel boring. A cut and cover method of construction would be required. Most of these issues are moderated when a substantially shorter tunnel is under consideration.

Based on tunnels operating in other parts of the U.S., annual operations costs are estimated to be between $5 million and $6 million. The tunnel would require an extensive ventilation system and specialized emergency services. The operation of a tunnel ventilation system would require a significant amount of electrical power. Providing the electrical power to the tunnel could lead to additional costs. A bridge-tunnel option could reduce the costs significantly, but is still estimated to cost over $1 billion.

The following is the evaluation of the roadway (tunnel) option relative to the purpose of the project:

Does a tunnel improve public safety?
The tunnel would provide another option for emergency personnel to reach or transport patients between South Padre Island and the mainland medical facilities. This transportation type could also contribute to an efficient emergency evacuation of the island. However, one consideration for the tunnel in case of an extreme weather event causing the evacuation (such as a hurricane or storm surge) would be what level of service during these extreme events would be required. Designing the tunnel portals and life safety systems to withstand the most severe storm events would increase the project construction cost. These increased costs would be related to constructing the portals to avoid flooding from surge during severe storm events. Additionally, tunnel facilities are typically designed and constructed with reduced shoulder and lane widths in order to minimize the overall tunnel size required, and therefore minimize the construction cost. It is logical to assume that if reduced shoulder or lane widths were implemented with the tunnel roadway option, the frequency of incidents would increase relative to a facility that did not have these width reductions. Likewise, if an incident does occur within the limits of these reduced shoulders or lanes, the impact of the disruption is compounded since there is no breakdown shoulder of sufficient width or emergency parking areas to remove the vehicles involved from the travel-way. A bridge-tunnel option would have these same concerns, only in a more limited area. However, both options would offer an improvement to public safety.

Does a tunnel enhance local and regional mobility?
A tunnel roadway option would excel at enhancing local and regional mobility. It would provide an additional access to South Padre Island, and the connections to the existing roadway system with a similar transportation type facility would allow ultimate flexibility for the users of the facility. Areas near to the constructed facility, as well as areas further removed from the project site that would be of interest to the users, would be easily accessible using this transportation type. The convenience of not having to switch modes of transport to access the regional attractions would tend to make a tunnel roadway option very desirable. The tunnel option would improve local and regional mobility.

Does a tunnel support economic development?
A tunnel roadway option would support economic development. Similar to the enhanced mobility offered by this roadway transportation type, the convenience and flexibility available to users of this facility would be expected to encourage economic development of the areas near to the constructed facility, as well as areas further removed from the project location that would be of interest to the travelers. This flexibility and ease of access would benefit both regular commuters and recreational or vacationing travelers. The tunnel option would support economic development.

Does a tunnel facilitate peak period congestion management (by offering an alternate route)?
Because travelers could continue to utilize their automobiles or roadway based transit alternatives, the tunnel roadway transportation type would provide an attractive option to users during peak periods of congestion.

Can a tunnel be accomplished in an environmentally sensitive manner?
The tunnel portal on the South Padre Island side of the project would need to be constructed in the Laguna Madre due to narrow width of the island. This would permanently disturb approximately 8 acres of the Laguna Madre and would require over 500,000 cubic yards of fill material. The cut and cover method of tunnel construction would also require the dredging of over 10 million cubic yards of material from the Laguna Madre. Despite these construction impacts, the tunnel option could allow for the re-establishment of the Laguna Madre ecosystem over time.

The extensive ventilation, lighting, and support systems required by a tunnel could lead to additional environmental impacts. To support these systems, a reliable source of energy would be required. The most likely source of energy would be electrical; requiring a new high-capacity power line to serve the tunnel.

The bridge (tunnel) option would have greater impacts than the full-length tunnel option. Two tunnel portals would be required where the bridge transitions into the tunnel. Each of these would require the construction of an island covering at least 8 acres of the Laguna Madre – the impact of the portals would be permanent. The area disturbed during construction with the tunnel or bridge-tunnel modal options may vary depending on the chosen method of construction. However, the tunnel option would have low long-term impacts to the environment.

2.2.4 Roadway (Bridge)

A roadway (bridge) option refers to any type of above water structure that would provide conveyance of automotive vehicles across the Laguna Madre. The bridge could be a single or twin structure and provided in any number of configurations; it could be a girder type, segmental, truss, arch, or even cable stay. The roadway (bridge) option could be constructed of concrete, steel, or a combination of these or other materials. For the 2nd Access Project, a roadway (bridge) concept would originate on the mainland near SH 100 and consist of a bridge crossing the Laguna Madre and terminating on South Padre Island. Unlike the roadway (tunnel) option, which would be located beneath the shipping channel, the roadway (bridge) is assumed to span over the Gulf Intracoastal Waterway and meet or exceed the navigational clearances required by the various governing agencies for this vital maritime channel.

Depending on the type of design, the project team estimates the construction of the roadway (bridge) option to cost between $350 million to $500 million. Annual operations and maintenance of the roadway (bridge) option is estimated to cost between $1 million to $2

million. Following is the evaluation of the roadway (bridge) transportation type relative to the purpose of the project:

Does a bridge improve public safety?
The roadway (bridge) would provide another option for emergency personnel to reach or transport patients between South Padre Island and the mainland medical facilities. This transportation type would also contribute greatly to an efficient emergency evacuation of the island, essentially doubling the capacity of the existing island evacuation routes. The roadway (bridge) option would improve public safety.

Does a bridge enhance local and regional mobility?
Similar to the roadway (tunnel) option, a roadway (bridge) option would excel at enhancing local and regional mobility. Areas near to the constructed facility, as well as areas further removed from the project site that would be of interest to the users, would be easily accessible using this transportation type. The convenience of not having to switch modes of transport to access the regional attractions would tend to make a roadway (bridge) option desirable. The roadway (bridge) option would enhance local and regional mobility.

Does a bridge support economic development?
A roadway (bridge) option would support economic development. Similar to the enhanced mobility offered by this roadway transportation type, the convenience and flexibility available to users of this facility would be expected to encourage economic development of the areas near to the constructed facility, as well as areas further removed from the project location that would be of interest to the travelers. This flexibility and ease of access would benefit both regular commuters and recreational or vacationing travelers. The roadway (bridge) option would support economic development.

Does a bridge facilitate peak period congestion management (by offering an alternate route)?
Since travelers could continue to utilize their automobiles or roadway based transit alternatives, the roadway (bridge) transportation type would provide an attractive option to users during peak periods of congestion.

Can a bridge be accomplished in an environmentally sensitive manner?
The area of direct impact of the roadway (bridge) option may range from less than one acre to 145 acres depending on the method of construction. Depending on the method of construction the bridge may require the dredging of a temporary channel approximately 12 feet deep to allow for maneuverability of construction barges and other equipment. This channel could be up to 160 feet wide. This could result in the removal of up to approximately 2.8 million cubic yards of material from the Laguna Madre. Since the dredge area would be restored to original grades and soil strata following construction, its impacts would be temporary. The area disturbed during construction with this modal option may vary depending on the chosen method of construction.

2.2.5 Modal Options Summary

Based on the evaluation documented above, a summary table has been developed illustrating the qualitative rating of each transportation type relative to the purpose statements for the South Padre Island 2nd Access Project.

As seen in **Table 2-2**, the qualitative ratings indicate the roadway (bridge) transportation modal type is the most viable transportation option for the 2nd Access Project. The roadway (bridge) option is equal to or superior to the other options for each of the project's purpose statements.

Finally, construction of the roadway (bridge) transportation mode type would not preclude development of another mode option in the future, as part of a separate study and project should the need be identified. The roadway (bridge) option is the proposed modal solution.

Table 2-2: Modal Options Summary

Modes	Construction Cost	Yearly Operational Cost	Public Safety	Mobility	Economic Development	Environmental Impacts
Rail Transit	$350-500 M	$10-12 M	Limited Improvement	Limited Improvement	Limited improvement	Would vary according to construction method
Ferry System	$110 M	$20-25 M	Limited Improvement	Limited Improvement	Limited improvement	Extensive, Adverse, Permanent
Roadway (Tunnel)	$4,800 M	$5-6 M	Improves	Improves	Improves	Extensive, Adverse, Temporary
Roadway (Bridge)	$350-500 M	$1-2 M	Improves	Improves	Improves	Would vary according to construction method

M = million
Note: Information, including cost estimates, presented in this table pertains only to the crossing of the Laguna Madre. For comparison purposes, all modes assume a 7.5-mile long crossing. Cost estimates do not reflect the cost of island or mainland connections.

2.3 OTHER TRANSPORTATION STRATEGIES CONSIDERED

An advantage of the selection of the roadway (bridge) option for development of the 2nd Access Project is that the other transportation strategies described in this section could be incorporated should further studies indicate implementation is warranted. In no case would the selection of a roadway (bridge) option preclude the incorporation of any of these strategies in the future.

2.3.1 High Occupancy Vehicle Lanes

A substantial amount of traffic between South Padre Island and the City of Port Isabel consists of tourist-related vehicles. The tourist traffic often consists of families traveling to the beach and resort destinations. Because many of these vehicles would contain more than two or three people, they would qualify as a high occupancy vehicle. The construction of high occupancy vehicle lanes would require the expansion of the existing Queen Isabella Memorial Causeway. The expansion of the existing causeway does not meet the need and purpose of the proposed project, because it would not provide an alternate route for emergency evacuation nor would it support economic development.

2.3.2 Bus Transit

The South Padre Island bus transit system, the Wave, provides public transportation within portions of the project area. The Wave serves both the City of Port Isabel and the Town of South Padre Island with two buses running hourly. Although the Wave provides mass transit between the island and the City of Port Isabel, the system is not capable of negating the need for roadway improvements. There are several reasons why public transportation is not able to meet the need and purpose for the 2nd Access Project. Public transportation accounts for a relatively low percentage of trips as the local economy is tourist driven. The tourist traffic relies heavily on privately-owned vehicles as they are typically driving to South Padre Island from

other cities or airports. Second, public transportation has difficulty in cost-effectively serving lower density, suburban and rural areas, as opposed to more densely developed urban areas. Third, travel behavior would have to be modified from using private vehicles to using public transportation.

Expansion of the bus transit service in the project area would not address the absence of an alternative access between the mainland and the island; thus, expanded bus transit service would not satisfy the project's need and purpose.

2.3.3 Bicycle and Pedestrian

Bicycle and pedestrian modal options would be insufficient to accommodate the traffic demand for the project area. Most of the traffic accessing the island consists of tourists utilizing privately-owned vehicles. Although the construction of bike or pedestrian lanes would offer alternative transportation modes and recreational uses, it would do little to decrease tourist-based traffic. In addition, the construction of bike/pedestrian lanes would require the expansion of the existing facility. This option does not meet the need and purpose for the proposed project.

Although this option does not satisfy the need and purpose of the proposed project, consideration was given for incorporation of bicycle and pedestrian accommodations into the project concept. As currently proposed and described in Section 2.6.3, sidewalks and outside shoulders (suitable for use by bicycles) would be provided on the island. The extreme length of the Laguna Madre crossing would limit the potential for bicycle and pedestrian traffic on the bridge. Pedestrian activity on the bridge would most likely be limited to unusual situations (stranded motorists, etc.). Nonetheless, the bridge would include outside shoulders that could accommodate bicycles and allow passage for motorists in emergency situations. Lack of development in the mainland portion of the project area limits current demand for bicycle and pedestrian provisions on the proposed facility. However, the ROW would be sufficient to accommodate the future construction of bicycle/pedestrian facilities when/if demand warrants in the future.

2.3.4 Transportation System Management

Transportation system management measures implemented at critical locations can improve traffic operations and public safety. These types of improvements are typically low cost measures that improve traffic flow by making better use of the existing transportation system. They typically include intersection improvements, parking and turn restrictions, traffic signal upgrades, signal coordination, median improvements and access control improvements. While the transportation system management alternative would be expected to ease congestion and travel time for the existing facility, this alternative would not adequately address critical issues identified in the project need and purpose statement. Transportation system management measures would not improve public safety by providing an additional evacuation route or emergency response route. Transportation system management measures would not enhance local and regional mobility by providing an alternate route to the island or increase connectivity to east-west corridors in the area. It is not consistent with local or regional development plans. For these reasons, a transportation system management alternative would not satisfy the project's need and purpose.

2.3.5 Travel Demand Management

Travel demand management measures are strategies and programs that encourage commuters to use alternatives to driving alone, especially during periods of heaviest congestion. These

strategies typically contribute to reducing congestion along a corridor as they manage the demand placed on the transportation system. Travel demand management measures are generally behavioral changes for the commuting public and also include employers offering flexibility and incentives to their employees to modify their travel patterns and modes. Examples of Travel demand management measures include carpooling/vanpooling, park and pool/park and ride lots, flexible work hours, telecommuting, employer incentives and transit.

Although Travel demand management measures could help improve congestion in an urban area, traffic congestion in the project area is not substantially caused by commuters. Travel demand management measures would not be applicable to the tourist traffic as there is little incentive to avoid peak congestion hours.

2.4 PHASE V – REASONABLE ALTERNATIVES REFINEMENT

Subsequent to identification of the reasonable alternatives (Phase III), the project team working in partnership with TxDOT identified a new alternative route not considered previously. It was determined that the new alternative would pass the fatal flaw/redundancy screenings (Phase II) and meet the criteria performance measures (Phase III). This route was designated Alternative 1-Modified at the Laguna Madre crossing and C-Modified on the mainland. The Alternative 1-Modified/C-Modified end-to-end combination allows consideration of the northern-most bay crossing in conjunction with the southern mainland options.

The primary benefit of this combination would be to maximum advantage of an existing utility cut across the Laguna Madre to minimize the impacts to the seagrass colonies while avoiding impacts to existing development (shrimp farm) located on Center Line Road.

Additionally, an adjustment was made during Phase V to the mainland routes utilizing Laguna Vista Drive north of Farm-to-Market Road (FM) 510. Previously, south of FM 510 these routes ran southwest connecting to SH 100 at the Buena Vista Drive intersection, roughly following the Holly Beach Pipeline alignment. This alignment had been assumed to occupy an existing unused utility easement; however, further data collection identified that the pipeline is active. Additionally, a comment received at Public Meeting #3 indicated that this alignment essentially forming a “Y” with SH 100 was not desirable because of the public perception that this would act to “funnel” traffic away from businesses further east along SH 100. Due to the new data and the public input, this alignment was adjusted to run directly south from FM 510 until just north of El Tular (a natural water feature), where it veers southwest and then south again around El Tular and connects to SH 100.

After the evaluation of the preliminary alternatives was completed, the USFWS purchased a parcel of land at the intersection of Buena Vista Drive and Center Line Road. The mainland route following Center Line Road west to this intersection required an adjustment to avoid impacting Section 4(f) land (the newly acquired refuge property). A “dogleg” was introduced to this alignment just east of the Buena Vista Drive intersection to avoid refuge property.

Finally, during an agency coordination meeting with the USFWS on September 17, 2009, the project team received requests for additional alternative alignment adjustments on the mainland. The first request was to shift the dogleg on Center Line Road even further south. USFWS acknowledged that the original dogleg was appropriately avoiding their recently acquired property; however, the adjusted alignment was now directly in the path of a large area of dense brush considered prime ocelot habitat. A second adjustment intersecting Buena Vista Drive

even further south that avoids the dense brush area south of the parcel that was acquired by USFWS was made in response to this resource agency request.

The second adjustment requested by USFWS affected alternatives on the mainland utilizing the South Holly Beach landing (mainland alternatives C and D). The original path was intended to minimize brush (dense and light) impacts by following the east-west portion of the Holly Beach Road ROW, and following the south property line of a large parcel fronting Buena Vista Drive that had been previously cleared of brush and trees. USFWS staff indicated that while this route would minimize brush impacts, they had data (not previously available to the project team) that indicated this was within or immediately adjacent to an important ocelot corridor. This ocelot corridor was considered more valuable to the agency than the brushier area to the south. A request was made by the USFWS to shift this east-west portion of the alignment south approximately 800 feet. This shift was made with the understanding that although the brush impacts would increase for these alternatives due to the alignment adjustment, a net positive gain was made regarding the ocelot and known travel patterns. This adjustment resulted in the proposed ROW splitting the northern portion of a large parcel adjacent to the Laguna Madre. The adjustment was subsequently discussed with the owner of the property, who also indicated support for this adjusted alignment. The pre-shift alignment is shown on **Exhibit 2-3**. The current alignment, as requested by the USFWS, is shown on **Exhibit 2-10**.

In summary, a total of 11 end-to-end alternatives were determined to be reasonable (ten identified during Phase III and one identified as a result of the Phase V refinements described above). These 11 end-to-end alternatives are hereafter referred to as reasonable alternatives 1–11. **Table 2-3** lists all 11 of the reasonable alternatives and their corresponding landing sites and bay crossing/mainland option designations. Following the table, a written description of each of the 11 alternatives is provided. The reasonable alternatives are also illustrated in **Exhibits 2-5** through **2-15**. Each of the reasonable alternatives, plus the No-Build Alternative, will be evaluated in the followings chapters of this environmental impact statement.

Table 2-3: Reasonable Alternatives - Terminus to Terminus

Alternative	Island Landing	Laguna Madre	Mainland Landing	Mainland Roadway
1	Beach Access 6	1	Center Line Road	A
2	Beach Access 6	1	Center Line Road	B
3	Beach Access 6	1-Modified	Mod Landing	C-Modified
4	Beach Access 5	2	Center Line Road	A
5	Beach Access 5	2	Center Line Road	B
6	Beach Access 5	3	Holly Beach Landing	C
7	Beach Access 5	3	Holly Beach Landing	D
8	The Shores	4	Center Line Road	A
9	The Shores	4	Center Line Road	B
10	The Shores	5	Holly Beach Landing	C
11	The Shores	5	Holly Beach Landing	D

Source: HNTB 2009

2.4.1 Alternative 1

Alternative 1 includes improvements to Park Road 100 starting at the end of the existing four-lane section near Andy Bowie Park and extending north for approximately 4.3 miles. Approximately 0.6 mile south of its northernmost extent on Park Road 100, Alternative 1 would extend from Park Road 100 approximately 8.3 miles southwest across the Laguna Madre, crossing the Gulf Intracoastal Waterway between mile markers 657 and 658, until connecting with Center Line Road on the mainland. Alternative 1 would then extend west along and include

improvements to Center Line Road for approximately 2.1 miles, until turning southwest 0.9 mile and west 0.4 mile to an intersection with Buena Vista Drive. Alternative 1 would then extend south approximately 3.5 miles along and include improvements to Buena Vista Drive, crossing FM 510 and terminating at SH 100 approximately 9.1 miles west of Port Isabel. The total length of Alternative 1 is approximately 19.4 miles.

2.4.2 Alternative 2

Alternative 2 includes improvements to Park Road 100 starting at the end of the existing four-lane section near Andy Bowie Park and extending north for approximately 4.3 miles. Approximately 0.6 mile south of its northernmost extent on Park Road 100, Alternative 2 would extend from Park Road 100 approximately 8.3 miles across the Laguna Madre crossing the Gulf Intracoastal Waterway between mile markers 657 and 658, until connecting with Center Line Road on the mainland. Alternative 2 would then extend west along and include improvements to Center Line Road for approximately 0.5 mile, until turning south for 2.8 miles, crossing FM 510 at the existing Holly Beach Road intersection and continuing 1.5 miles south and southwest around El Tular to terminate at SH 100 approximately 7.4 miles west of Port Isabel. The total length of Alternative 2 is approximately 17.4 miles.

2.4.3 Alternative 3

During the refinement of the alternatives, Alternative 3 was introduced as a modification to Alternative 1. Alternative 3 includes improvements to Park Road 100 starting at the end of the existing four-lane section near Andy Bowie Park and extending north for approximately 4.3 miles. Approximately 0.6 mile south of its northernmost extent on Park Road 100, Alternative 3 would extend from Park Road 100 approximately 8.3 miles southwest across the Laguna Madre, crossing the Gulf Intracoastal Waterway between mile markers 657 and 658, to a landing site south of Center Line Road. Alternative 3 would then extend southwest for approximately 2.4 miles and west for approximately 1.0 mile until intersecting with Buena Vista Drive near the intersection of FM 510. Alternative 3 would then extend south approximately 2.9 miles along and include improvements to Buena Vista Drive to its terminus at SH 100 approximately 9.1 miles west of Port Isabel. The total length of Alternative 3 is approximately 19.0 miles.

2.4.4 Alternative 4

Alternative 4 includes improvements to Park Road 100 starting at the end of the existing four-lane section near Andy Bowie Park and extending north for approximately 3.2 miles. Approximately 0.4 mile south of its northernmost extent on Park Road 100, Alternative 4 would extend from Park Road 100 approximately 7.9 miles southwest across the Laguna Madre, crossing the Gulf Intracoastal Waterway south of mile marker 658, until connecting with Center Line Road on the mainland. Alternative 4 would then extend west along and include improvements to Center Line Road for approximately 2.1 miles, until turning southwest 0.9 mile and west 0.4 mile to an intersection with Buena Vista Drive. Alternative 4 would then extend south approximately 3.5 miles along and include improvements to Buena Vista Drive, crossing FM 510 and terminating at SH 100 approximately 9.1 miles west of Port Isabel. The total length of Alternative 4 is approximately 18.0 miles.

2.4.5 Alternative 5

Alternative 5 includes improvements to Park Road 100 starting at the end of the existing four-lane section near Andy Bowie Park and extending north for approximately 3.2 miles. Approximately 0.4 mile south of its northernmost extent on Park Road 100, Alternative 5 would

extend from Park Road 100 approximately 7.9 miles southwest across the Laguna Madre, crossing the Gulf Intracoastal Waterway south of mile marker 658, until connecting with Center Line Road on the mainland Alternative 5 would then extend west along and include improvements to Center Line Road for approximately 0.5 mile, until turning south for 2.8 miles, crossing FM 510 at the existing Holly Beach Road intersection and continuing 1.5 miles south and southwest around El Tular to terminate at SH 100 approximately 7.4 miles west of Port Isabel. The total length of Alternative 5 is approximately 15.9 miles.

2.4.6 Alternative 6

Alternative 6 includes improvements to Park Road 100 starting at the end of the existing four-lane section near Andy Bowie Park and extending north for approximately 3.2 miles. Approximately 0.4 mile south of its northernmost extent on Park Road 100, Alternative 6 would extend from Park Road 100 approximately 7.9 miles southwest across the Laguna Madre, crossing the Gulf Intracoastal Waterway north of mile marker 659 and making its landing approximately 800 feet south of Holly Beach Road. Alternative 6 would then extend approximately 3.7 miles to the west until intersecting with Buena Vista Drive near the intersection of FM 510. Alternative 6 would then extend south 2.9 miles along and include improvements to Buena Vista Drive to its terminus at SH 100 approximately 9.1 miles west of Port Isabel. The total length of Alternative 6 is approximately 17.6 miles.

2.4.7 Alternative 7

Alternative 7 includes improvements to Park Road 100 starting at the end of the existing four-lane section near Andy Bowie Park and extending north for approximately 3.2 miles. Approximately 0.4 mile south of its northernmost extent on Park Road 100, Alternative 7 would extend from Park Road 100 approximately 7.9 miles southwest across the Laguna Madre, crossing the Gulf Intracoastal Waterway north of mile marker 659 and making its landing approximately 800 feet south of Holly Beach Road. Alternative 7 would then extend approximately 1.3 miles to the west until turning south for approximately 1.3 miles, crossing FM 510 at the existing Holly Beach Road intersection and continuing approximately 1.5 miles south and southwest around El Tular to terminate at SH 100 approximately 7.4 miles west of Port Isabel. The total length of Alternative 7 is approximately 15.2 miles.

2.4.8 Alternative 8

Alternative 8 includes improvements to Park Road 100 starting at the end of the existing four-lane section near The Shores development and extending approximately 0.38 mile to the north. Approximately 0.04 mile south of its northernmost extent on Park Road 100, Alternative 8 would extend from Park Road 100 approximately 7.9 miles west across the Laguna Madre, crossing the Gulf Intracoastal Waterway south of mile marker 659, until connecting with Center Line Road on the mainland. Alternative 8 would then extend west along and include improvements to Center Line Road for approximately 2.1 miles, until turning southwest 0.9 mile and west 0.4 mile to an intersection with Buena Vista Drive. Alternative 8 would then extend south approximately 3.5 miles along and include improvements to Buena Vista Drive, crossing FM 510 and terminating at SH 100 approximately 9.1 miles west of Port Isabel. The total length of Alternative 8 is approximately 15.1 miles.

2.4.9 Alternative 9

Alternative 9 includes improvements to Park Road 100 starting at the end of the existing four-lane section near The Shores development and extending approximately 0.38 mile to the north. Approximately 0.04 mile south of its northernmost extent on Park Road 100, Alternative 9 would

extend from Park Road 100 approximately 7.9 miles west across the Laguna Madre, crossing the Gulf Intracoastal Waterway south of mile marker 659, until connecting with Center Line Road on the mainland. Alternative 9 would then extend west along and include improvements to Center Line Road for approximately 0.5 mile, until turning south for 2.8 miles, crossing FM 510 at the existing Holly Beach Road intersection and continuing approximately 1.5 miles south and southwest around El Tular to terminate at SH 100 approximately 7.4 miles west of Port Isabel. The total length of Alternative 9 is approximately 13.0 miles.

2.4.10 Alternative 10

Alternative 10 includes improvements to Park Road 100 starting at the end of the existing four-lane section near The Shores development and extending approximately 0.38 mile to the north. Approximately 0.04 mile south of its northernmost extent on Park Road 100, Alternative 10 would extend from Park Road 100 approximately 7.4 miles southwest/west across the Laguna Madre, crossing the Gulf Intracoastal Waterway north of mile marker 660, and making its landing approximately 800 feet south of Holly Beach Road. Alternative 10 would then extend approximately 3.7 miles to the west until intersecting with Buena Vista Drive near the intersection of FM 510. Alternative 10 would then extend south approximately 2.9 miles along and include improvements to Buena Vista Drive to its terminus at SH 100 approximately 9.1 miles west of Port Isabel. The total length of Alternative 10 is approximately 14.4 miles.

2.4.11 Alternative 11

Alternative 11 includes improvements to Park Road 100 starting at the end of the existing four-lane section near The Shores and extending approximately 0.38 mile to the north. Approximately 0.04 mile south of its northernmost extent on Park Road 100, Alternative 11 would extend from Park Road 100 approximately 7.4 miles southwest/west across the Laguna Madre, crossing the Gulf Intracoastal Waterway north of mile marker 660, and making its landing approximately 800 feet south of Holly Beach Road. Alternative 11 would then extend approximately 1.3 miles to the west until turning south for approximately 1.3 miles, crossing FM 510 at the existing Holly Beach Road intersection and continuing 1.5 miles south and southwest around El Tular to terminate at SH 100 approximately 7.4 miles west of Port Isabel. The total length of Alternative 11 is approximately 12.0 miles.

2.4.12 No-Build Alternative

Under the No-Build Alternative, a second access would not be constructed, and traffic congestion and demand would continue to increase. Under the no-build scenario, it is assumed that the other projects included in the *CCRMA System Map* (CCRMA April 2008) would occur. Although not within the immediate study area of the 2nd Access Project, the following projects are within the vicinity of the 2nd Access Project and would improve mobility within Cameron County:

- West Loop (West Parkway) – construct four lanes within the existing Union Pacific ROW;
- U.S. Highway (US) 77 – upgrade facility from Corpus Christi to Brownsville;
- FM 509 – new location extension from US 77 to FM 508/FM 509 intersection;
- East Loop – new location bypass around Brownsville to the east;
- SH 550 – limited-access toll facility on new location from approximately 0.7 mile north of FM 3248 to SH 48;
- Port Entrance Road – improved entrance to the Port of Brownsville entrance;
- Outer Loop – from US 77 north of the Harlingen airport to the 2nd Access Project study area; and

- North Rail Relocation – new rail line in western Cameron County.

2.5 PHASE VI – IDENTIFICATION OF THE RECOMMENDED PREFERRED ALTERNATIVE

The recommended preferred alternative was identified through a multi-stage process that involved extensive analysis of public safety, mobility, economic development, and environmental impacts, as well as consideration of input from resource agencies, local elected and appointed officials and the public. During the evaluation of the reasonable alternatives, emphasis was placed on criteria distinguishing those alternatives which best met the project need and purpose. All the reasonable alternatives meet the need and purpose in regards to public safety, mobility, and economic development. Therefore, the environmental impacts provide the basis of comparison between the reasonable alternatives and were used to identify the recommended preferred alternative.

The No-Build Alternative does not satisfy the need and purpose of the proposed project; however, FHWA, TxDOT and Council on Environmental Quality guidelines for the preparation of environmental documents require that the No-Build Alternative be carried forward as the basis of comparison for all reasonable alternatives.

Alternatives 1, 2, 4 and 5 are located within 0.5 mile of the Laguna Atascosa National Wildlife Refuge. These alternatives also bisect the Harlingen Shrimp Farm, fragmenting this facility. On the mainland side of the project area, the South Padre Island Golf Club/Community is expanding northwest of Laguna Vista. Alternatives 2, 5, 7, 9 and 11 would require the displacement of one of the residences in South Padre Island Golf Club/Community and one commercial building.

An intersection with Park Road 100 on the island near Andy Bowie Park could not be designed without impacts to either the park or to The Shores development. Impacts to the park would be a fatal flaw for the alternatives; therefore, the intersection impacts The Shores. Alternatives 8, 9, 10, and 11 would impact approximately 90 platted residential lots located at The Shores development on South Padre Island. In addition, Alternatives 9 and 11 would directly impact one commercial facility. Because of these various impacts, Alternatives 1, 2, 4, 5, 7, 8, 9, 10 and 11 were removed from consideration as the recommended preferred alternative.

The remaining alternatives, Alternatives 3 and 6, would not result in the displacement of residential or commercial properties, would minimize impacts to existing or proposed development, and would not impact the shrimp farm. Alternatives 3 and 6 would have similar impacts to Piping Plover critical habitat. Alternative 6 would impact approximately 38 more acres of potential ocelot habitat than Alternative 3. However, at the request of the USFWS, Alternative 6 was shifted into an area with more potential habitat in order to avoid impacting a known ocelot corridor. Alternative 3 still crosses the ocelot corridor which was avoided by Alternative 6 when it was shifted south at the request of the USFWS. Although Alternative 6 would potentially impact approximately 19 more acres of seagrass, Alternative 3 would have approximately 11 acres more potential impact to wetlands. Alternative 3 would also impact approximately 43 more acres of floodplain. Additionally, Alternative 3 is 1.4 miles longer and based on this length could be more costly to construct. Based on the difference between the potential impacts, Alternative 3 was removed from consideration as the recommended preferred alternative.

Based on a complete and thorough evaluation of the reasonable alternatives, as documented in **Chapter 4,** Alternative 6 is the recommended preferred alternative for the proposed South Padre Island 2nd Access Project. Refer to **Chapter 4** for details regarding potential environmental impacts from each build alternative.

2.6 DESCRIPTION OF THE PROPOSED ACTION

In conjunction with development of this environmental impact statement, an evaluation of possible modal solutions was undertaken. Based on the results of the modal evaluation, a roadway (bridge) solution was identified as the most effective means of addressing the need and purpose of the proposed project. Accordingly, a partially access controlled highway facility is proposed. The proposed facility would extend from SH 100 on the mainland to Park Road 100 on South Padre Island.

The proposed 2nd Access Project would consist of three major components: the mainland roadway, the Laguna Madre crossing and the island roadway. Tolling is proposed for the bridge and bridge approaches. Controlled access is proposed within the limits of tolling; outside the limits of tolling, the project would be non-controlled access. The toll collection system would be entirely electronic; thus, toll plazas would not be required and no cash or tokens would be needed. Toll collection equipment (cameras, strobe lights and vehicle identification sensors) would be supported approximately 20 feet above the roadway surface on structures called gantries. The gantries, which are structures similar in appearance to typical highway sign bridges, would be located at each end of the bridge. Auxiliary equipment needed to support the toll system would be housed in control cabinets located within the right-of-way near the toll gantries.

Construction would not begin until after receipt of the record of decision. Once initiated it is anticipated that construction would take three years to complete. The current estimated date of completion is 2015. The ROW, utility and mitigation costs are all site specific and cannot be accurately estimated at this time. Construction costs are estimated between $406-482 million, depending on the alternative.

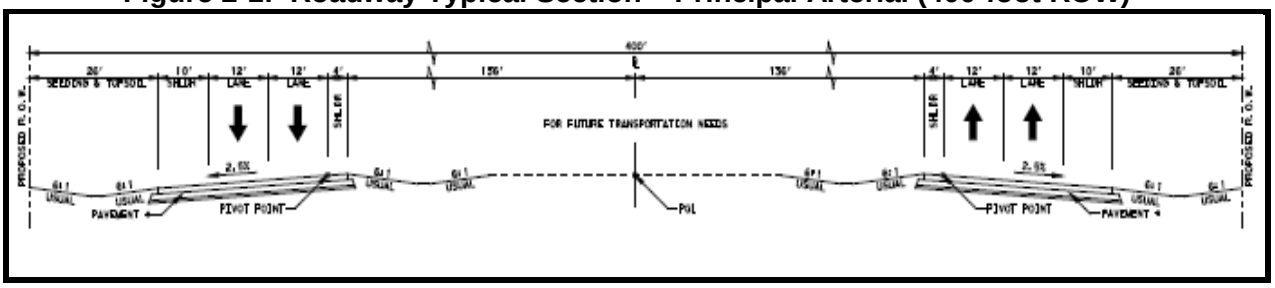
The following descriptions of the roadway typical section components reflect planning efforts, to date. As the project is developed further, minor refinements to the project concept could occur. Although these refinements could affect the typical sections, the refinements would not be expected to alter the results of the alternatives analysis or impacts analyses presented in this document.

2.6.1 Mainland Roadway Component

The mainland roadway component of the proposed 2nd Access Project involves two distinct typical sections.

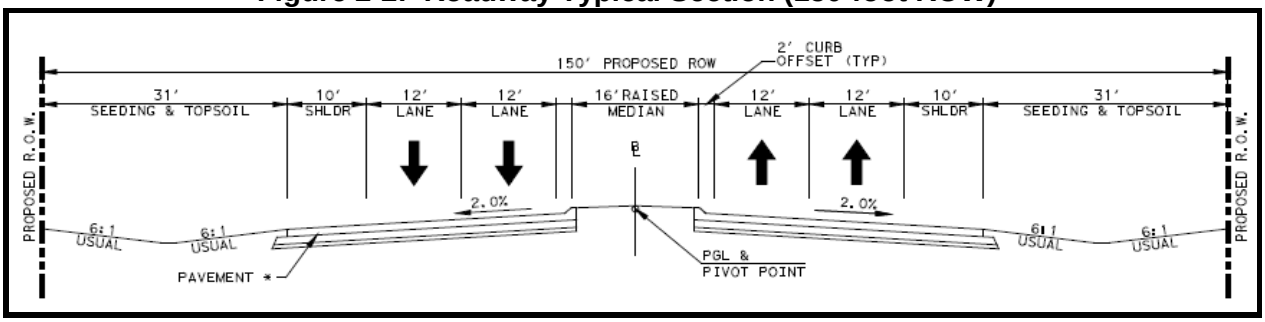
As currently proposed, the first typical section (principal arterial-type) would require 400-feet of ROW with four 12-foot lanes (two lanes in each direction), a 270-foot median, 4-foot inside and 10-foot outside shoulders with open ditch drainage (**Figure 2-1**). The 270-foot median, which would be acquired by Cameron County under authority granted to counties by the Texas State Legislature, would separate travel lanes and be reserved for future transportation use. The 400-foot section is proposed from the Laguna Madre west to the intersection of the proposed project and the first major intersecting roadway. Depending upon the alternative selected, this would be Buena Vista Drive, Laguna Vista Drive or FM 510.

Figure 2-1: Roadway Typical Section – Principal Arterial (400-foot ROW)



As currently proposed, the second typical section would be composed of a 150-foot ROW containing four 12-foot lanes (two lanes in each direction), a 16-foot raised median, 2-foot curb offset on the inside and 10-foot outside shoulders with open ditch drainage (**Figure 2-2**). The 150-foot section would extend south from the end of the 400-foot section to SH 100 (the southern terminus of the proposed project). Due to the primarily rural nature of the mainland in the location of the alternatives, pedestrian facilities are not included in the proposed project. However, the mainland ROW would be sufficient width to accommodate the addition of pedestrian facilities should future demand warrant construction. Possible addition of pedestrian facilities would be subject to environmental review and public involvement prior to construction.

Figure 2-2: Roadway Typical Section (150-foot ROW)

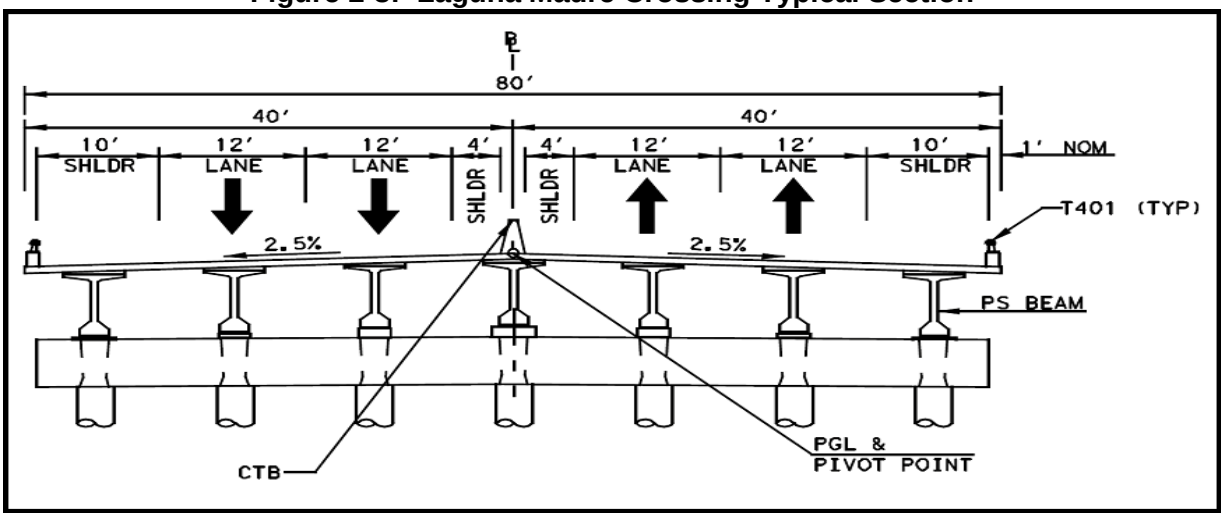


2.6.2 Laguna Madre Crossing Bridge Component

A bridge is proposed for the crossing of the Laguna Madre; however, due to the complexities associated with the extreme length of the proposed bridge, the exact design would be determined during the final design phase of the project (after a final decision on the environmental impact statement) rather than during the planning/environmental study phase. The structure, which would consist of a main span unit over the Gulf Intracoastal Waterway and approaches on each side of the main span, could take one of any number of forms.

For purposes of environmental study and this environmental impact statement, a single 80-foot wide bridge is assumed. It would consist of four 12-foot travel lanes (two lanes in each direction) and a concrete traffic barrier in the middle separating direction of travel. Four-foot inside and 10-foot outside shoulders are also proposed (**Figure 2-3**). Although a dedicated emergency lane is not proposed, the design of the roadway could accommodate emergency vehicles on the 10-foot outside shoulder.

Figure 2-3: Laguna Madre Crossing Typical Section



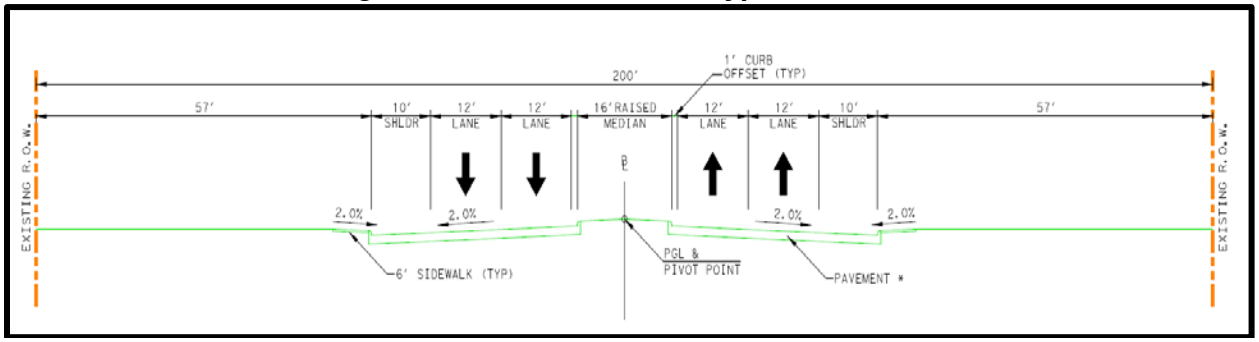
The proposed bridge would span the Gulf Intracoastal Waterway with a perpendicular (or near perpendicular) crossing of the navigation channel. The center span would be between 250 and 350 feet long. The bridge would have a minimum vertical clearance of 73-feet above mean high tide (equal to the vertical clearance of the existing Queen Isabella Causeway) with a minimum horizontal clearance of 125 feet from the center of the channel.

2.6.3 Island Landing Component

As is the case on the mainland, two typical sections are also proposed on the island. The first typical section would extend from the bridge to an intersection with Park Road 100. Within this area, the 400-foot typical section described above and shown in **Figure 2-1** is proposed.

The second typical section reflects improvements to Park Road 100 and would extend from the intersection of the 400-foot section (described above) south to the existing four-lane section of Park Road 100. Within this area, Park Road 100 would be reconstructed as a four-lane roadway. As currently proposed, Park Road 100 would consist of four 12-foot travel lanes (two in each direction), 10-foot shoulders, and 6-foot sidewalks. Directions of travel would be separated by a raised median (**Figure 2-4**). No additional ROW would be required to accommodate this section; the additional travel lanes would be constructed within the existing 200-foot ROW of Park Road 100.

Figure 2-4: Park Road 100 Typical Section



2.7 POTENTIAL CONSTRUCTION METHODS

A variety of most likely construction methods may be considered for the 2nd Access Project implementation and this range of methods should provide flexibility to establish cost efficiency while maintaining environmental sensitivity. Access for bridge construction including delivery of equipment and materials to the new location site and means to install bridge structures across shallow waters of the Laguna Madre are key factors to be considered. Also, areas to receive and stage equipment and materials on South Padre Island, the mainland, and over the waterway will need to be established.

Some assumptions were used for all the reasonable alternatives in order to compare the various methods since there are still many unknown factors at this time in project development. The results of a bottom elevation survey, to be done at a later date, will enable a more accurate construction cost estimate to be developed. More refined construction methods and considerations will continue to develop through continued project coordination and permit coordination for the recommended preferred alternative following the public hearing and during preparation of the final environmental impact statement.

2.7.1 Bridge Types

The various construction methods will need to be tailored to the specific bridge type. Consideration of steel superstructures has been eliminated as long term maintenance issues with steel corrosion in a harsh coastal environment make this type of structure not desirable. As such, pre-stressed concrete beams, pre-stressed concrete spliced girders, and segmental concrete bridges will be considered for bridge types. Based on similar bridge crossings, repeating causeway spans of approximately 140 feet are assumed with a 250-foot minimum main span required for the navigation channel. With the deep sands in Laguna Madre, pre-stressed pile foundations are assumed for substructure either as pile bents or waterline pile groups. The specific bridge type and span configuration; however, will be determined during the detailed design phase and, as such, may vary from these assumptions.

2.7.2 Construction Access

Regardless of selected bridge type, means to deliver materials to the site and erect the bridge over the waterway needs to be considered. Potential most likely methods for construction include:

- Parallel dredging
- Parallel trestle
- Parallel sheet piling/haul road
- Top down or stepped out construction

2.7.2.1 Parallel Dredging

Dredging a parallel trench to the proposed bridge is an economical option for construction access. For dredging operations up front time would be required to dredge a channel for construction. However, once access is established, the project could be rapidly constructed from vessels in the waterway. Using a dredged parallel trench provides the least restrictive access for construction. Also, supply of equipment and materials from the waterway would significantly reduce construction impacts on roadway access to a heavily travelled tourist destination.

For dredging, a 12-foot deep trench is assumed with bottom width up to 140 feet. The total temporary easement required would be 160 feet. Total spoil material is estimated at 2.5 million

cubic yards with an estimated construction impact of $25 million to project cost. The trench could remain in place after construction with natural infilling over time or the trench could be backfilled after construction is complete.

Impacts from dredging would be similar to current dredging in Laguna Madre that is performed to maintain the Gulf Intracoastal Waterway, although for the 2nd Access Project dredging would be a temporary impact.

2.7.2.2 Parallel Trestle

A parallel trestle used as a construction platform is a method that would limit the construction footprint. Steel piles would be driven into Laguna Madre with a pier-like trestle constructed just above the waterline. This parallel temporary bridge would be removed once the proposed bridge was complete. The total temporary easement required would be 80 feet.

Temporary construction trestles are more suited for shorter installation of less than ½ mile. For the 2nd Access Project the cost to construct a parallel trestle would be prohibitively expensive. Estimated cost to construct parallel trestles for the full length of the approaches to the navigation span would be approximately $100 million to install and remove after construction is complete.

2.7.2.3 Parallel Sheet Piling/Haul Road

Parallel access could also be established by using sheet piling with a filled haul road. The total temporary easement required would be 80 feet. Estimated cost to drive sheet piling and install a haul road would be approximately $120 million. This option would have significant impacts including forming a temporary barrier across the Laguna Madre, temporary removal of bottom vegetation, and disturbance upon removal of fill material. This option is one of the most expensive.

2.7.2.4 Top Down or Stepped Out Construction

Under this option the bridge is progressively constructed from land by overhanging successive spans from each of the previous ones in a linear manner. The total temporary easement required would be 20 feet. This method would require specialized gantries. Construction of the bridge would be limited by the rate at which a span could be completed and the gantry advanced. This method significantly impacts progression of work and potentially adds 1 to 2 years to construction time. For top down construction, span length may be constrained to less than optimum length resulting in up to 50% more piers in the Laguna Madre. With stepped out segmental construction longer spans could be provided; however, a segmental bridge would likely require larger waterline foundations with a much larger footprint within the Laguna Madre and have significant construction cost impacts. Cost for top down or stepped out construction methods is estimated to be higher than other construction methods.

2.7.2.5 Conclusions

The following table (**Table 2-4**) compares the construction methods based on difficulty of construction, access, supply route, temporary easement, cost, and impact to schedule.

Table 2-4: Comparison of Potential Construction Methods

Construction Methods	Impact to Laguna Madre	Construction Access	Supply Route	Temporary Easement	Cost	Schedule Impacts*
Dredging	Moderate	Favorable	Waterway	160 feet	$110 SF	30 to 42 months
Trestle	Low/Moderate	Some Limitations	Land	80 feet	$130 SF	36 to 48 months
Sheet Pile	High	Some Limitations	Land	80 feet	$140 SF	42 to 54 months
Top Down/ Stepped Out	Low	Limited	Land	20 feet	>$160 SF	42 to 54 months

Source: HNTB 2012
*If a combination of these methods are utilized, construction duration may change

A combination of the options may provide a favorable approach. While a trestle or sheet piling haul road may be prohibitively expensive as a sole means of access, their use in combination with dredging may be viable. An access road using sheet piling/fill or a trestle may be useful for a limited length near shore in combination with a dredged access channel.

Construction of the bridge using a combination of bridge types might also be a favorable option. For example pre-stressed beam on pile bents may be the most appropriate bridge option for low level spans while segmental construction may be a feasible option for the navigation span.

The final construction method implemented will be based on a competitive bidding process and the contractor would have some flexibility in construction methods and materials within limitations established by approved permits. The contractor would be responsible for obtaining any temporary permits needed and modifications to the USACE and USCG permit based on final construction plans.

CHAPTER 3

AFFECTED ENVIRONMENT

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CHAPTER 3

AFFECTED ENVIRONMENT

The study area for the 2nd Access Project is eastern Cameron County and is defined as the area between San Roman Road to the west, the Gulf of Mexico to the east, northeast Brownsville to the southwest, South Bay to the southeast and rural South Padre Island to the north. Cities and towns within the study area include South Padre Island, Port Isabel, Laguna Heights, Laguna Vista, Bayview, and Brownsville. **Chapter 3** describes the affected environment within the study area for the 2nd Access Project.

3.1 LAND USE

This section describes land use from two geographic perspectives. The first is a regional review of existing land use, which encompasses all of Cameron County. Secondly, land use is discussed for the study area (**Exhibit 3-1**). This section discusses the historical development patterns within the region, as well as existing and proposed land uses and local government plans and policies for the region and study area.

3.1.1 Historical Development Patterns

Cameron County is one of the fastest growing areas in the country (Cameron County 2009). Settlement within Cameron County dates back over 10,000 years. The first Spanish explorers arrived in Cameron County in the 17th century. Much of the economy in the early years was based on trade, and by 1860, the City of Brownsville was a principal port for the shipment of cotton and supplies to Confederate troops. During the latter half of the 19th century, Cameron County's economy was based largely on ranching.

In 1904, the St. Louis, Brownsville and Mexico Railway was built through the county, which opened the area for settlement by Midwestern farmers. Between 1920 and 1930, the number of farms in Cameron County grew from 1,507 to 2,936, and by 1940 there were 3,243 farms in the county. The rise of agriculture can be attributed to the introduction of commercial-scale farming, irrigation, and the growth of cotton as a cash crop.

During World War II, Cameron County served as an important food production and shipping center; in the 1940s, the county's population increased rapidly. The farming economy expanded quickly in the postwar years, and the production of crops such as grapefruit, oranges and sugarcane established Cameron County as one of Texas' most productive agricultural areas by the early 1960s. In the early 1990s, more than 80 percent of county land was in farms and ranches.

Cameron County has also become a favored tourist destination. Winter visitors arrive from the north, attracted by the warm climate and low cost of living. Spring and summer visitors flock to the area to visit the beaches on South Padre Island, which became a resort destination during the mid-20th century. Other visitor attractions include fishing, bird watching, recreational boating, dolphin watching and shopping.

The City of Port Isabel, the "gateway" to South Padre Island, was settled in the 1830s. The first modern use of Port Isabel as a seaport occurred in 1935, and the completion of the Queen Isabella Causeway in 1954 drew tourists to the area. The shrimping industry contributes significantly to the local economy, and during the 1960s, 65 percent of Texas' production of shrimp came from the Port Isabel area. During the 1980s, Port Isabel continued to attract tourists, and recreational opportunities included fishing, boating and hunting (Garza and Long

2009). Ecotourism, which is defined as "environmentally responsible travel to natural areas, in order to enjoy and appreciate nature (and accompanying cultural features, both past and present) that promote conservation, have a low visitor impact and provide for beneficially active socioeconomic involvement of local peoples" (The Nature Conservancy 2009), has since replaced the shrimping industry as the force that drives the local Port Isabel economy (Padre Island Economic Development Corporation 2009).

South Padre Island was not developed until after the completion of the Queen Isabella Causeway in 1954. With new access to the island, entrepreneurs started building motels and resorts. In September 1967, the island was hit by Hurricane Beulah, which slowed development. In 1978, South Padre Island had a population estimated at 314. Within the next 10 years, the population of South Padre Island tripled, and the primary industry of tourism began to boom. South Padre Island has seen intense development during the past 20 years with most of the businesses related to the tourist trade. Currently, tourism drives South Padre Island's economy.

3.1.2 Local Government Plans and Policies

Municipal governments in the state of Texas are granted broad authority to regulate land use within their respective jurisdictions. This authority allows considerable flexibility in the adoption of zoning and subdivision ordinances as well as land use and transportation plans. The proposed 2nd Access Project study area comprises portions of several local government jurisdictions that have adopted land use or transportation policies for the purpose of controlling future growth within their municipal limits and extraterritorial jurisdiction area. A general theme among the land use and transportation projects is a focus of current land use planning efforts in the Laguna Madre and South Padre Island areas that include an attempt to revitalize the area with renewed recreation (including ecotourism), economic development and transportation improvements. Such efforts by local governments are intended to ensure the orderly growth of their respective communities through determinations about future land use intensity, transportation and utilities.

Within the mainland portion of the study area, zoning and land use planning are regulated by the Cities of Port Isabel and Brownsville and Cameron County. The Town of Laguna Vista does not have an adopted comprehensive plan; however, town officials have developed a commercial development strategy (City of Port Isabel 2005; City of Brownsville 2009; Laguna Vista Commercial Development Task Force 2008).

Zoning and land use planning on South Padre Island are regulated by the City of South Padre Island and Cameron County (Town of South Padre Island 2008).

3.1.2.1 Imagine Brownsville – City of Brownsville Comprehensive Plan

The *Imagine Brownsville – City of Brownsville Comprehensive Plan* (2009) provides a foundation for guiding the future growth and development of the city that is consistent with the vision and goals of the community. The plan, which was adopted in July 2009, includes numerous elements, including a Land Use Plan and a Thoroughfare Plan.

The Land Use Plan element provides a foundation for the creation, capture and transfer of land value to increase property tax revenues thereby supporting higher levels of service and lowering pressure to increase tax rates. Additionally, it reduces the cost of municipal services by promoting infill and reducing urban sprawl and provides a means to attract private capital and

cluster-based industrial development. Lastly, it promotes mixed use, pedestrian-friendly developments integrated with public facilities and open space elements.

The portion of the study area included in *Imagine Brownsville – City of Brownsville Comprehensive Plan* (2009) is located within Brownsville's extraterritorial jurisdiction and is designated as "Reserve Future City District" and "Water Management District." The Future Land Use Module of the *Imagine Brownsville – City of Brownsville Comprehensive Plan* (2009) defines future land uses and development within these districts. Specifically, the purpose of the "Reserve Future City District" is to promote infill and redevelopment within the existing City of Brownsville by discouraging growth and sprawl into this largely undeveloped area. Future development within the "Reserve Future City District" should be largely residential with lot sizes of at least 10 acres. Future development within the "Water Management District" should consist primarily of community facilities with an emphasis on natural resources and wildlife habitats for promotion of the City of Brownsville's development of ecotourism.

The Thoroughfare Plan element focuses on the regional movement of people via various transportation modes, including pedestrian, transit and bicycle travel. Included in this element is a hypothetical future transit system that suggests a commuter rail line route from downtown Brownsville extending northeast to the City of South Padre Island. This hypothetical rail line would traverse the southern portion of the study area and tie into the island on its south side.

3.1.2.2 City of Port Isabel Comprehensive Plan

The *City of Port Isabel Comprehensive Plan, Planning Period 2005-2015* (2005) includes a Land Use chapter that addresses the goals, objectives and policies for land use that are interrelated with other aspects of a master plan for the City of Port Isabel. The City's land use goals, as defined in the planning document, include the following:

- Support sound use of land by balancing man-made and natural environments and making the most effective use of existing infrastructure;
- Promote the development of urban land in a manner consistent with attracting residents, visitors and desirable commercial investments, while conforming to desired land growth restrictions and goals; and
- Encourage and implement a promotional program utilizing local resources for the attraction of quality developments.

Port Isabel's comprehensive plan does not include the proposed 2nd Access Project. However, specific guidance for future development includes improvement of existing streets with the greatest traffic flow, which includes State Highway (SH) 100 and SH 48. Specifically, the comprehensive plan states that SH 100 requires extensive maintenance because of its high use. The proposed project would ease congestion through the City of Port Isabel which, in turn, would potentially lessen maintenance requirements on SH 100.

3.1.2.3 Town of Laguna Vista Comprehensive Plan

The Town of Laguna Vista does not currently have a comprehensive plan; although a plan is being developed. However, in 2008 the Laguna Vista Commercial Development Task Force developed a commercial development strategy (Laguna Vista Commercial Development Task Force 2008) that provides a suggested action plan for implementing the strategy. The commercial development strategy entails methods for attracting business development in the community by using a six-point approach, which includes the following:

- Strive to retain, and capitalize on, the small town ambiance of the Town of Laguna Vista and its sense of uniqueness, attractiveness, history, and cultural and social diversity. This includes creating public gathering places and creating a strong local sense of place and relaxed living;
- Seek out new business ventures needed in the community;
- Group business ventures together that will have synergy;
- Optimize use of all available land, both private and public;
- Market the patronage of local businesses; and
- Capitalize on the Community Development Council Section 4b revenue.

The commercial development strategy recommends making changes to land use and zoning codes to accommodate these goals. It is expected that these goals will be included within the forthcoming comprehensive plan.

3.1.2.4 Town of South Padre Island Comprehensive Plan

South Padre Island was officially charted (recognized as a city) on December 12, 2009. All references to the "Town of South Padre Island" in this draft environmental impact statement pertain to documents published prior to the charter date.

The *Town of South Padre Island, Texas, Comprehensive Plan* (2008) defines the town's vision for its future physical and economic development. This document applies to both the incorporated City of South Padre Island and an outer perimeter area that includes the City's extraterritorial jurisdiction area that extends out to 1 mile. This document was designed to give form to the vision and is intended to accommodate South Padre Island's future growth and seize its economic development opportunities in a manner that is both livable and sustainable.

Land use goals outlined in the *Town of South Padre Island's Comprehensive Plan* include the following:

- New development and redevelopment must add value to the image and appearance of the City of South Padre Island;
- Future development must be compatible with the character of surrounding areas;
- Existing neighborhoods should be preserved and enhanced; and
- A broad variety of housing types and price ranges are warranted to balance the residential market.

Chapter four of the City's comprehensive plan outlines goals and recommendations for the City of South Padre Island related to transportation infrastructure, including specific reference to the proposed second access with a statement that the second access is critical to the future of the City of South Padre Island. The chapter also states that the only island location for the proposed causeway that will serve the current and future needs of the town is north of the existing South Padre Island Convention and Visitor's Bureau.

The plan recommends that the city appoint a liaison to attend Cameron County Regional Mobility Authority (CCRMA) board meetings and cooperate to improve valley-wide transportation to the island, periodically review the city's thoroughfare plan as the final alignments are determined and prepare comments for submission during the draft environmental impact statement comment period.

Additionally, the "Vision Statement" for the City of South Padre Island in the year 2020 states:

> "A second causeway has been constructed providing an alternative link to the mainland and improved egress for emergency evacuation. The new causeway respects the delicate ecological balance and recreational functions of the Laguna Madre. The design of the causeway and its approach to the island provides a distinctive image as an entry feature or gateway" (Town of South Padre Island 2008).

3.1.3 Other Plans and Regulations

3.1.3.1 CCRMA Strategic Plan, 2007-2011

On June 22, 2004, the Cameron County Commissioners Court authorized the County Judge to file a petition to the Texas Transportation Commission to create a Regional Mobility Authority for the Cameron County area, which was approved by the Texas Transportation Commission on September 30, 2004. The Commissioners Court formally approved the conditions set forth by the CCRMA and, subsequently appointed the Directors of the CCRMA.

The CCRMA was established to assist the citizens of South Texas in providing congestion relief, traffic safety, enhanced mobility and viable alternative routes in the rapidly growing Rio Grande Valley area. The *Cameron County Regional Mobility Authority Strategic Plan, 2007-2011* (2006) establishes the basic framework toward the CCRMA's mission of developing regional solutions for improving the transportation infrastructure and economic development in Cameron County. The CCRMA works with the numerous cities in Cameron County, as well as the State of Tamaulipas, Mexico, to construct projects at a much more rapid pace than would normally occur. The CCRMA works very closely with the Texas Department of Transportation (TxDOT) on several on-going projects in Cameron County. The initial projects that were submitted with the CCRMA application to the Texas Transportation Commission were the West Loop project in the City of Brownsville and the proposed 2nd Access Project.

3.1.3.2 Section 4(f) of the Department of Transportation Act of 1966

Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 USC 303) requires documentation when right-of-way (ROW) will be taken from publicly owned parks, recreation areas, wildlife or waterfowl refuges, publicly or privately owned historic properties and archaeological sites that merit preservation in place. For federally-funded projects, the Section 4(f) documentation must demonstrate that there is no prudent or feasible alternative to the proposed action and that the project includes all possible planning to minimize harm to the resource. If a determination is made that there is no feasible or prudent alternative to the use of land from the property and the action includes all possible planning to minimize harm to the property resulting from such use, then the use may be approved.

Use occurs when land from a Section 4(f) property is acquired for a transportation project and (1) there is an occupancy of land that is adverse in terms of the statute's preservationist purposes; or (2) the proximity of impacts of the transportation project on the Section 4(f) property, without acquisition of land, are so great that the purposes for which the Section 4(f) exists are substantially impaired (this is referred to as "constructive use").

A substantial portion of the northern and southern portions of the study area are included in the National Wildlife Refuge system. Additionally, there are several public parks and recreation areas within the project study area.

3.1.4 Existing and Proposed Land Uses

The following paragraphs provide an overview of the region, followed by a discussion of land uses within the proposed 2nd Access Project study area.

3.1.4.1 Regional Overview

A review of the Cameron County Appraisal District's land use data and corresponding map reveals that a large majority of the land in the region is dedicated to agricultural use. These agricultural lands generally include croplands, pasturelands or rangelands and account for approximately 47.9 percent of the total land area in the county. Undeveloped land occupies approximately 32.8 percent and public lands account for approximately 11.1 percent of Cameron County. Other land uses in the county include residential (6.7 percent), commercial (1.3 percent) and industrial (0.2 percent) (Cameron County Appraisal District 2009). **Exhibit 3-1** illustrates land uses within Cameron County.

3.1.4.2 Existing Land Uses Within Study Area

The existing land uses within the proposed 2nd Access Project study area were initially identified through interpretation of aerial photography, supplemented by the use of public mapping sources, such as TxDOT county highway maps, U.S. Geological Survey topographic maps and county and municipal planning documents. Land use within the proposed 2nd Access Project study area tends to be undeveloped and agricultural with residential and commercial land uses concentrated within the municipal limits of the Port Isabel, Laguna Vista, South Padre Island and Bayview.

The dominant land use within the proposed 2nd Access Project study area is public land/parks, including U.S. Fish and Wildlife Service (USFWS) managed properties (i.e., Laguna Atascosa and Lower Rio Grande National Wildlife Refuge Systems) located in the study area (**Exhibit 3-2**), which accounts for approximately 36.1 percent of the total study area. The second most abundant land uses are agriculture and undeveloped land, which account for 30.5 percent and 27.9 percent of the total land area within the study area, respectively. Other land uses within the study area include residential properties (2.5 percent), industrial properties (2.1 percent), and commercial properties (0.9 percent) (Cameron County Appraisal District 2009). **Exhibit 3-2** shows land uses within the proposed 2nd Access Project study area.

Public Lands

A substantial portion of the study area is included in the National Wildlife Refuge system and are under the jurisdiction of the USFWS. The Laguna Atascosa National Wildlife Refuge (LANWR) and the Lower Rio Grande Valley National Wildlife Refuge are both located in the study area. Because of the relatively undeveloped nature of the western portion of the study area, the USFWS is attempting to provide a connection between these two National Wildlife Refuges by linking these undeveloped lands. This connection would provide a wildlife corridor for the endangered ocelot and other wildlife.

Several public parks and recreation areas are within the project study area. Existing park facilities on South Padre Island include Water Tower Park, which is an approximately 0.5 acre park located within the City of South Padre Island; Isla Blanca Park, which consists of approximately 305 acres with approximately 1 mile of Gulf of Mexico beach frontage, is located on the southern tip of South Padre Island; Andy Bowie Park, which consists of approximately 225 acres located just north of the City of South Padre Island; and E. K. Atwood Park, which consists of approximately 2.43 acres and is located north of the City of South Padre Island.

Additionally, the Laguna Madre Nature Trail and South Padre Island Birding and Nature Center are located adjacent to the South Padre Island Convention and Visitor's Bureau.

Public lands, parks and recreation areas within the study area are identified in **Exhibit 3-3.**

Agricultural

During World War II, Cameron County served as an important food production and shipping center, and the farming economy expanded quickly in the postwar years to include the production of crops such as grapefruit, oranges and sugarcane. By the early 1960s, Cameron County was established as one of Texas' most productive agricultural areas, and in the early 1990s, more than 80 percent of county land was in farms and ranches. Currently, the majority of the agricultural land in the study area is used as rangeland (i.e., grazing). Other agricultural land uses within the study area consist of citrus orchards near the Bayview area, which is at the junction of San Jose Road and San Roman Road at the western boundary of the study area, and sorghum, corn, sugarcane and cotton, which are common in the northern portions of the study area.

Undeveloped Land

Undeveloped lands are defined as areas that are privately owned and are currently undeveloped and not used for agricultural purposes, which include grazing. Undeveloped land within the proposed 2nd Access Project study area is scattered throughout the unincorporated areas on the mainland, as well as north of the City of South Padre Island on the island.

Residential

Residential properties are typically concentrated in the local communities of Laguna Vista, Port Isabel, South Padre Island and Bayview. Approximately 74 percent of the residential properties, including single-family homes, multi-family homes and condominium and high-rise condominiums, within the City of South Padre Island are considered vacant, meaning that they are likely vacation properties or those owned by "winter Texans" (Town of South Padre Island 2008). Additionally, there are residential properties not currently built in the master planned communities of The Shores on South Padre Island and the South Padre Island Golf Club/Community on the mainland, as discussed in **Section 3.1.4.4**.

Industrial

The industrial land uses within the study area are centered on the City of Brownsville ship channel and portions of the City of Port Isabel adjacent to the various ship channels.

Commercial

Commercial properties on the mainland are generally concentrated adjacent to SH 100 in the City of Port Isabel and Farm-to-Market Road (FM) 510 in Laguna Vista. Commercial properties on the island are generally concentrated along Park Road 100. The majority of commercial development within the study area is associated with tourism.

3.1.4.3 Utilities Within Study Area

Utility service providers within the study area include the Laguna Madre Water District, which provides water and wastewater services; Southern Union Gas, which provides natural gas service; AEP Texas, Central Power and Light Company and TXU Energy, which provide electricity service; and AT&T, which provides telephone service.

A visual survey was performed to determine the major utilities within the study area. Based on the visual observation, the following utilities were observed in the study area: pipelines, cable, conduit, fiber, water lines, sanitary sewer lines, cell towers and overhead transmission lines. Communication towers were identified via an online database, AntennaSearch.com. There are 25 known towers within the study area. **Table 3-1** provides a listing of all communication towers within the proposed 2nd Access Project study area.

Table 3-1: Communication Towers Within Study Area

Owner/Operator	Height (feet)	Location (Mainland/Island)
Alternative Broadcasting Company	342.9	Mainland
O.E. Investments, Inc.	480.0	Mainland
O.E. Investments, Inc.	480.0	Mainland
WWC Texas RSA Limited Partnership/Verizon Wireless	120.1	Mainland
Alltel Communications	139.1	Island
U.S. Customs Service	310.0	Island
Unknown	351.0	Island
City of South Padre Island	29.9	Island
RC Minority Telecommunicate, Inc.	225.1	Island
San Antonio MTA, LP	188.0	Island
Padre Central I, LP	241.1	Island
Spanish Aural Services	335.0	Island
Unknown	210.0	Mainland
Betty Howell	212.9	Island
Matthew C. Trub	312.0	Mainland
Matthew Trub	339.9	Mainland
No Mis Communications, Inc.	500.0	Mainland
Spanish Aural Services	308.1	Mainland
General Dynamics Information Technology, Inc.	415.0	Island
U.S. Coast Guard	60.0	Island
Moorhouse Construction	105.0	Island
American Towers, Inc.	190.0	Mainland
U.S. Border Patrol	276.9	Mainland
American Towers, Inc.	244.1	Mainland
American Towers, Inc.	349.1	Mainland

Source: AntennaSearch.com, General Data Resources, Inc. (2009)

Pipelines were researched based on recorded data provided by the Texas Railroad Commission. There are five natural gas pipelines within the study area. **Table 3-2** provides a listing of the major pipelines, pipeline company and line size within the study area (**Exhibit 3-16**).

Table 3-2: Pipelines Within Study Area

Pipeline Name	Operator	Diameter (inches)	Commodity
Three Islands to Holly Beach Lateral	Texas Gas Service Company	6.63	Natural Gas
Holly Beach to Brownsville (Port Area) Lateral	Texas Gas Service Company	6.63	Natural Gas
Holly Beach to Brownsville (Port Area) Lateral	Texas Gas Service Company	8.63	Natural Gas
189A	Enterprise Products Operating, LLC	6.63	Natural Gas
189/7	Enterprise Products Operating, LLC	2.38	Natural Gas

Source: Railroad Commission of Texas (2009)

3.1.4.4 Proposed Land Uses Within Study Area

The Rio Grande Valley, which encompasses the proposed 2nd Access Project study area, is emerging as a major metropolitan area. Higher property values on South Padre Island are inhibiting commercial development on the island; this results in a focus of future commercial development on the mainland (TXP, Inc. 2009).

The Town of Laguna Vista formed a commercial development task force during the fall of October 2007 to establish guidelines and goals for the planned growth of the town. The task force identified several existing areas that could be utilized for commercial development; most areas are located along FM 510. Additionally, the South Padre Island Golf Club/Community, which includes residential and vacation properties, as well as an 18-hole golf course, is currently being developed on the north side of the Town of Laguna Vista (**Exhibit 3-4**).

Property development on the island is active, with the majority of the development in the form of condominiums and businesses to attract visitors. The largest development currently under construction on the island is "The Shores," which consists of approximately 250 acres on both the Gulf of Mexico and the Laguna Madre sides of the island. The Shores is proposed to include approximately 1,500 single-family homes and condominiums, a 250-room hotel and 50,000 square feet of mixed use office/retail/restaurant development. Other recent, ongoing and future development includes the Sapphire, a 30-story high-rise condominium; the Azul, a 10-story condominium; The Inspire, a new development with 90 luxury condominiums/hotel residences; and The Cottages at South Padre Island, a development for tourists with 20 luxury homes (**Exhibit 3-4**) (Donahue 2009).

In addition to the aforementioned developments, there are over 1,000 acres of developable land on the island to the north of The Shores. These properties are within the extraterritorial jurisdiction of the City of South Padre Island (Phillip 2009). There are currently no zoning restrictions; however, the City of South Padre Island is petitioning for "home rule" designation, which would allow the town to annex the area to the north without landowner consent, thereby providing the City of South Padre Island regulatory and planning authority (Vasquez 2009). Although water, sanitary sewer and electric utilities currently stop just north of The Shores, a group of landowners has entered into an agreement with the Laguna Madre Water District to extend the water and sanitary sewer lines to the north. As water, sanitary sewer and electric utilities are extended north on South Padre Island, additional housing and tourism-related developments would be expected to follow (Phillip 2009).

The City of Port Isabel does not currently have any plans for development (Meza 2009).

3.2 SOCIAL AND ECONOMIC CONDITIONS

3.2.1 Social Conditions

This section discusses the social and economic conditions within the study area, focusing on a comparison of its population, demographic, employment, and income characteristics with the Town of Laguna Vista, the City of South Padre Island, the City of Port Isabel, the Town of Bayview and Cameron County. Socioeconomic information was collected from *Census 2000* (U.S. Census Bureau (USCB)) for census blocks and census block groups that comprise the 2nd Access Project study area. The availability of census data for median household income and Limited English Proficiency is limited to the census block group level; therefore, race/ethnicity data are presented at both the census block and census block group levels in Sections 3.2.1.3 and 3.2.1.5. Census block groups either partially or wholly contained by the 2nd Access Project

study area are included in this analysis and are shown in **Exhibit 3-5**. Data and information were also collected from a report titled the *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009).

3.2.1.1 Population and Demographic Characteristics

Population Characteristics

Regional Population Growth

Population in this region has increased steadily from 2000 to 2007. The Rio Grande Valley area of Texas is one of the fastest growing regions in the country. Cameron County's growth rate is significantly higher than that of other counties in Texas and of the U.S. Historically, the study area has experienced rapid population growth, and this trend is projected to continue based on population forecasts from the Texas State Data Center.

Cameron County's population base has expanded during the past decade. Since 1980 Cameron County has added 177,483 residents, an increase of approximately 85 percent. From 2000 to 2007, the County added 51,000 residents, an increase of approximately 15 percent. Within Cameron County, the City of Brownsville remains the largest community accounting for approximately 45 percent of the County's total population. The study area communities of South Padre Island, Laguna Vista, and Port Isabel have also expanded since 1980 and during the past 7 years (**Table 3-3**). In 2007, the Town of Laguna Vista's population surpassed that of the City of South Padre Island. The City of Port Isabel's growth potential is constrained by the limited amount of developable land within the city's existing jurisdictional boundaries. The Town of Bayview, which is only partially located within the study area, is the least populated incorporated community in the study area but experienced substantial population growth from 1980 to 2007. The Cities of Los Fresnos, San Benito and Harlingen have also experienced growth and are located within Cameron County but outside of the study area.

Table 3-3: Cameron County Population Trends

Year	City of South Padre Island	Town of Laguna Vista	City of Port Isabel	Town of Bayview	City of Los Fresnos	City of San Benito	City of Harlingen	City of Brownsville	Cameron County
1980	791	632	3,769	291	2,173	17,988	43,543	84,997	209,727
1990	1,677	1,166	4,467	231	2,473	20,125	48,735	98,962	260,120
2000	2,418	1,677	5,018	410	4,574	23,990	58,885	143,383	335,227
2001	2,405	1,757	5,036	421	4,683	23,929	59,311	147,396	342,684
2002	2,457	2,005	5,295	439	4,787	24,082	59,777	151,760	350,407
2003	2,495	2,137	5,302	459	4,912	24,153	60,854	156,788	358,366
2004	2,537	2,367	5,303	482	5,043	24,247	61,499	161,228	365,815
2005	2,548	2,560	5,292	506	5,143	24,361	62,250	165,223	372,703
2006	2,648	2,784	5,292	515	5,234	24,486	62,847	169,096	379,708
2007	2,752	3,250	5,268	527	5,361	24,715	64,221	172,806	387,210
Percent Change (2000 to 2007)	13.8	93.8	5.0	28.5	17.2	3.0	9.1	20.5	15.0

Source: USCB, States and Metropolitan Area Data Book

Regional Population Projections

According to the Texas State Data Center, during the 25-year period from 2000 through 2025, Cameron County's population is expected to increase from 335,227 in 2000 to approximately

542,338 in 2025. This projection for Cameron County results in a population growth of approximately 61.7 percent.

Population Within the Project Study Area

According to the Texas State Data Center, Cameron County's population in 2007 was 387,210. Since 2000, the County's population grew by an additional 50,648 residents, an increase of approximately 15 percent during this 7-year period. In comparison, the population within the study area increased approximately 34.8 percent (5,123 persons) from 14,741 in 1990 to 19,864 in 2000. **Table 3-4** shows population data for each of the 13 census block groups either partially or wholly within the study area for the year 2000 as well as each of the 11 census block groups partially or wholly within the study area in 1990. Because census block group boundaries change between decennial census years and new census block groups are created or deleted based on spatial demographic changes from census year to census year, census block groups in 1990 are not coextensive with census block groups in 2000. Additionally, census block groups may exist for the decennial census in 2000 but not for the decennial census in 1990, which is the case here. Consequently, changes in population for census block groups from *Census 1990* to *Census 2000* do not necessarily reflect actual population changes within the same geographic area. Further, in 1990, only 11 census block groups are partially or wholly contained by the study area.

Table 3-4: Study Area Population By Census Block Groups

Census Tract, Block Group	1990 Population	2000 Population	Percent Change (1990 to 2000)
CT 101.00, BG 5	325	583	79.4
CT 122.00, BG 1	1,230	3,560	189.4
CT 123.01, BG 1	1,562	2,208	41.4
CT 123.01, BG 2	976	93	-90.5
CT 123.01, BG 3	1,877	1,196	-36.3
CT 123.01, BG 4	1,774	N/A	--
CT 123.01, BG 5	1,389	N/A	--
CT 123.01, BG 6	1,392	N/A	--
CT 123.02, BG 1	1,966	3,640	85.1
CT 123.03, BG 1	N/A	2,106	--
CT 123.04, BG 1	N/A	1,899	--
CT 123.04, BG 2	N/A	814	--
CT 123.04, BG 3	N/A	2,113	--
CT 124.00, BG 3	1,184	N/A	--
CT 124.03, BG 1	N/A	1,057	--
CT 124.03, BG 2	N/A	523	--
CT 127.00, BG 1	1,066	72	-93.2
Study Area Total	**14,741**	**19,864**	**34.8**

Source: USCB 1990 and 2000. Census 1990 Summary Tape File 1 (STF 1) – 100-Percent Data and 2000 Summary File (SF 1) 100-Percent Data.
"N/A" – Census block group does not exist for that decennial census year.

3.2.1.2 Age

A comparison of the ages in the population of the study area with that of Cameron County reveals a similar proportion of residents ages 20 to 64 and ages 19 and under. **Table 3-5** shows that for the study area and county - population ages generally consist of approximately 32 to 37 percent in the 19 and under range, approximately 51 to 55 percent in the 20-64 range, and approximately 11 to 13 percent of people in the 65 and over range. Median ages are similar among Cameron County, the Town of Laguna Vista, and the City of Port Isabel while the City of South Padre Island and the Town of Bayview contain populations with considerably higher median ages.

Table 3-5: Age Comparisons (2000)

Age Category	Study Area	Cameron County	Town of Laguna Vista	City of Port Isabel	City of South Padre Island	Town of Bayview
Total Population	19,864	335,227	1,658	4,865	2,422	323
Ages 19 and under	6,457	124,734	551	1,631	337	93
Percent of Total	*32.5*	*37.2*	*33.3*	*33.5*	*13.9*	*28.8*
Ages 20-64	10,916	173,118	958	2,642	1,639	172
Percent of Total	*55.0*	*51.6*	*57.8*	*54.4*	*67.7*	*53.2*
Ages 65 and over	2,491	37,375	149	592	446	58
Percent of Total	*12.5*	*11.2*	*8.9*	*12.1*	*18.4*	*18.0*
Median Age	N/A	29	33	32	47	41

Source: USCB 2000. Census 2000 Summary File (SF 1) 100-Percent Data.

3.2.1.3 Race/Ethnicity

As reflected in the census block group totals shown in **Table 3-6**, persons of Hispanic ethnic origin (may be of any race) account for approximately 66.9 percent of the population of the study area. Persons of Hispanic ethnic origin (may be of any race) account for approximately 84.5 percent of Cameron County. White residents make up approximately 14.4 percent of the population of Cameron County, and the remaining residents consist of persons in some other racial category. The study area as a whole includes approximately 68.7 percent non-White persons and 31.3 percent White residents. This includes persons in all non-White racial categories, including Black or African American, American Indian, Asian or Pacific Islander, some other race, or two or more races.

Census block groups are comprised of aggregated census blocks. A total of 742 census blocks are located either partially or wholly within the study area, 347 of which contain resident populations. Percentages of minority populations in census blocks containing resident populations within the study area are provided in **Appendix K**.

Table 3-6: 2000 Race and Ethnicity

Census Tract/Block Group	Total Population*	Percent White, non-Hispanic	Percent Black or African American	Percent American Indian/ Alaskan Native	Percent Asian American	Percent Some Other Race	Percent Two or More Races	Percent Hispanic or Latino	Percent Total Minority Population
Cameron County	335,227	14.4	0.3	0.1	0.5	<0.1	0.2	84.5	85.4
Town of Laguna Vista	1,642	53.9	0.0	0.0	0.2	0.0	0.0	45.9	46.1
City of Port Isabel	4,868	21.8	1.8	0.4	0.0	0.0	0.9	75.1	78.2
City of South Padre Island	2,445	71.8	0.9	0.8	0.2	0.0	0.8	25.7	27.6
Study Area									
CT 101.00, BG 5	544	48.3	1.8	2.6	0.0	0.0	3.9	43.3	47.7
CT 122.00, BG 1	3,602	10.7	0.2	0.7	0.0	0.0	0.0	89.3	90.2
CT 123.01, BG 1	2,195	43.7	0.0	0.2	0.5	0.0	0.0	56.1	56.8
CT 123.01, BG 2	80	36.3	0.0	0.0	0.0	0.0	0.0	63.8	63.8
CT 123.01, BG 3	1,215	21.6	4.2	2.6	0.0	0.0	0.0	71.6	78.4
CT 123.02, BG 1	3,640	79.6	0.9	0.6	0.1	0.0	0.5	18.5	20.1
CT 123.03, BG 1	2,113	3.8	0.0	0.0	0.0	0.0	0.0	96.2	96.2
CT 123.04, BG 1	1,896	13.6	0.0	0.8	0.0	0.0	0.0	86.4	87.2
CT 123.04, BG 2	896	33.4	0.0	2.0	0.0	0.0	1.5	63.2	65.2
CT 123.04, BG 3	2,034	24.9	4.2	0.0	0.0	0.0	1.5	69.4	73.6
CT 124.03, BG 1	1,001	14.4	0.0	0.3	0.0	0.0	0.2	85.4	85.7
CT 124.03, BG 2	498	13.5	0.0	0.0	1.0	0.0	0.0	85.5	86.5
CT 127.00, BG 1	55	54.5	0.0	0.0	0.0	0.0	0.0	45.5	45.5
Study Area Total	**19,769**	**31.3**	**0.9**	**0.7**	**0.1**	**0.0**	**0.7**	**66.9**	**68.6**

Source: USCB 2000. Census 2000 Summary File (SF 3) Sample Data.
**Population for whom Summary File (SF 3) Sample Data race and ethnicity data are compiled.*

The presence of racial and ethnic minorities in the study area is shown at the census block group level, with many percentages in individual racial and ethnic minority categories above 50 percent. Racial or ethnic minority groups account for the majority of all but three of the 13 census block groups in the study area. The distribution of race and ethnicity among the census block groups in the study area is varied. A large majority (71 percent) of the residents of the City of South Padre Island are White. In contrast, the majority of residents in the southern areas of the mainland portion of the study area are of Hispanic origin. Overall, minorities account for 68.7 percent of the study area. The census block groups exhibit minority populations that range from 20.1 to 96.2 percent. Of the 13 census block groups that comprise the study area, 10 exhibit minority populations greater than 51 percent.

3.2.1.4 Median Household Incomes

Income and poverty data from *Census 2000* reveal the economic conditions of communities in the study area. **Table 3-7** exhibits 1999 income and poverty data for the census block groups that comprise the proposed 2nd Access Project study area.

Table 3-7: Median Household Income and Poverty Status

Census Tract/Block Group	Population *	Median Household Income	Persons Below Poverty Level	
			Number	Percent
CT 101.00, BG 5	544	$27,222	193	35.5
CT 122.00, BG 1	3,598	$21,901	1,413	39.3
CT 123.01, BG 1	2,195	$37,500	434	19.8
CT 123.01, BG 2	80	$23,875	42	52.5
CT 123.01, BG 3	685	$43,125	258	21.2
CT 123.02, BG 1	3,639	$42,431	399	11.0
CT 123.03, BG 1	2,111	$18,778	986	46.8
CT 123.04, BG 1	1,886	$26,227	320	17.0
CT 123.04, BG 2	887	$22,717	335	37.8
CT 123.04, BG 3	2,021	$23,871	663	32.8
CT 124.03, BG 1	993	$22,143	482	48.5
CT 124.03, BG 2	498	$19,063	221	44.4
CT 127.00, BG 1	55	$11,250	15	27.3
Study Area Total	**19,192**	**N/A**	**5,761**	**30.0**

Source: USCB 2000. Census 2000 Summary File (SF 3) Sample Data.
* Population for whom poverty status has been determined.

At the census block group level, median household incomes in the study area ranged from $11,250 to $43,125, according to *Census 2000*. The percentage of the total population in study area census block groups below the poverty level is 30.0 percent. The percentage of persons living below the poverty level ranges from 11.0 to 52.5 percent for the individual census block groups. The most current available federal poverty measure is the 2012 U.S. Department of Health and Human Services (DHHS) poverty guideline, which establishes the poverty level for a family of four at $23,050. Median household incomes for six of the census block groups in the study area [Census Tract (CT) 122.00, Block Group (BG) 1; CT 123.03, BG 1; CT 123.04, BG 2; CT 124.03, BG 1; CT 124.03, BG 2 and CT 127.00, BG 1] are below the 2012 poverty threshold.

3.2.1.5 Environmental Justice Community Profile

Executive Order 12898

Executive Order 12898 "Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations" requires each federal agency to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." The Federal Highway Administration (FHWA) has identified three fundamental principles of environmental justice:

1. To avoid, minimize, or mitigate disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority populations and low-income populations;
2. To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process; and
3. To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority populations and low income-populations.

Disproportionately high and adverse human health or environmental effects are defined by FHWA as adverse effects that:

1. Are predominately borne by a minority population and/or a low-income population; or
2. Will be suffered by the minority population and/or low-income population and are appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population.

FHWA Order 6640.23 applies the following definitions for minority and low-income populations, which are consistent with the definitions for Executive Order 12898 that have been issued by the federal Council on Environmental Quality (CEQ) and the U.S. Environmental Protection Agency (EPA).

Minority means a person who is:

- Black (having origins from any of the black racial groups of Africa);
- Hispanic (of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race);
- Asian-American (having origins from any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent or the Pacific Islands); or
- American Indian and Alaskan Native (having origins from any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition).

Minority Population means any readily identifiable group of minority persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed FHWA program, policy or activity. Minority populations were identified based on the federal CEQ's guidance document *Environmental Justice: Guidance Under the National Environmental Policy Act* (CEQ 1997). Based on this guidance

> "Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis…"

Low-Income means a household income at or below the DHHS poverty guidelines (i.e., $23,050 in 2012).

Low-Income Population means any readily identifiable group of low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who would be similarly affected by a proposed FHWA program, policy, or activity.

Unlike the CEQ guidance (1997a) on minority population, no environmental justice order or guidance document contains a quantitative definition of how many low-income individuals constitute a low-income population. In the absence of guidance for this analysis, one of the measures used to identify low-income populations was the median household income for the inclusive census tracts (CTs) and/or census block groups (BGs). As described above, the

FHWA defines low-income as "a person whose household income level is at or below the Department of Health and Human Services poverty guidelines." In 2012 (most recent available), the DHHS poverty guidelines for a family of four persons is $23,050.

The primary source of demographic data was *Census 2000* because it is the most comprehensive, complete, and detailed data source currently available. Minority and low-income demographics within the study area census block groups are shown in **Table 3-8**. It should be noted that some persons fall into more than one of these categories. As such, these percentages should not be combined to represent the area population because doing so would result in duplication. For example, the columns for racial minority populations include all income levels, and low-income populations may be a racial minority, ethnic minority, or any mix of demographic characteristics.

Table 3-8: Minority and Low-Income Characteristics of the Study Area

Census Geography	Total Area Population*	Percent Black or African American	Percent American Indian	Percent Asian-American	Percent Hispanic or Latino	Total Minority Percentage	Percent Below Poverty Level	Median Household Income
CT 101.00, BG 5	544	1.8	2.6	0.0	43.3	47.7	35.5	$27,222
CT 122.00, BG 1	3,598	0.2	0.7	0.0	89.3	**90.2**	39.3	**$21,901**
CT 123.01, BG 1	2,195	0.0	0.2	0.5	56.1	**56.8**	19.8	$37,500
CT 123.01, BG 2	80	0.0	0.0	0.0	63.8	**63.8**	52.5	$23,875
CT 123.01, BG 3	685	4.2	2.6	0.0	71.6	**78.4**	21.2	$43,125
CT 123.02, BG 1	3,639	0.9	0.6	0.1	18.5	20.1	11.0	$42,431
CT 123.03, BG 1	2,111	0.0	0.0	0.0	96.2	**96.2**	46.8	**$18,778**
CT 123.04, BG 1	1,886	0.0	0.8	0.0	86.4	**87.2**	17.0	$26,227
CT 123.04 BG 2	887	0.0	2.0	0.0	63.2	**65.2**	37.8	**$22,717**
CT 123.04, BG 3	2,021	4.2	0.0	0.0	69.4	**73.6**	32.8	$23,871
CT 124.03, BG 1	993	0.0	0.3	0.0	85.4	**85.7**	48.5	**$22,143**
CT 124.03, BG 2	498	0.0	0.0	1.0	85.5	**86.5**	44.4	**$19,063**
CT 127.00, BG 1	55	0.0	0.0	0.0	45.5	45.5	27.3	**$11,250**
Study Area Total	**19,192**	**0.9**	**0.7**	**0.1**	**66.9**	**68.6**	**30.0**	**N/A**

Source: USCB 2000. Census 2000 Summary File (SF 3) Sample Data.
**Population for whom poverty status has been determined.*

The bolded data in **Table 3-8** show study area census block groups with minority population proportions high enough to be considered minority EJ based on the CEQ's guidance for median household incomes which fall below the 2012 DHHS poverty guideline. A total of 10 of the 13 census block groups have racial or ethnic minority percentages greater than 50 percent. **Table 3-8** also shows six census block groups (CT 122.00, BG 1; CT 123.03, BG 1; CT 123.04, BG 2; CT 124.03, BG 1; CT 124.03, BG 2 and CT 127.00, BG 1) with median household incomes below the DHHS 2012 poverty guideline ($23,050). The following census block groups contain

EJ populations based either on proportions of minority populations or median household incomes below the DHHS poverty guideline: CT 122.00, BG 1; CT 123.01, BG 1; CT 123.01, BG 2; CT 123.01, BG 3; CT 123.03, BG 1; CT 123.04, BG 1; CT 123.04, BG 2; CT 123.04, BG 3; CT 124.03, BG 1; CT 124.03, BG 2; and CT 127.00, BG 1.

As stated previously, census block groups are comprised of aggregated census blocks. A total of 742 census blocks are located either partially or wholly within the study area, 347 of which contain resident populations. Percentages of minority populations in census blocks containing resident populations within the study area are provided in **Appendix K**. Of the 347 census blocks containing resident populations in the study area, 153 reflect racial or ethnic minority percentages greater than 50 percent.

3.2.1.6 Limited English Proficiency Considerations

Executive Order 13166 "Improving Access to Services for Persons with Limited English Proficiency" required agencies to examine the service they provide, identify any need for services to those with limited English proficiency, to provide those services so that limited English proficiency persons can have meaningful access to them.

An analysis was conducted to identify residents in the study area that may have Limited English Proficiency. This analysis was conducted at the census block group level, the smallest level geographic area for which Limited English Proficiency data are provided by the USCB. The results are presented in **Table 3-9**.

Table 3-9: Limited English Proficiency Population: 1999

Census Block Group	Total Population 5 Years and Older	Total Number Who Speak English "Not Well" or "Not at All"	Limited English Proficiency (percent)
CT 101.00, BG 5	509	25	4.9
CT 122.00, BG 1	3,285	676	20.6
CT 123.01, BG 1	2,001	72	3.6
CT 123.01, BG 2	68	19	27.9
CT 123.01, BG 3	1,125	378	33.6
CT 123.02, BG 1	3,523	98	2.8
CT 123.03, BG 1	1,914	508	26.5
CT 123.04, BG 1	1,786	397	22.2
CT 123.04, BG 2	786	196	24.9
CT 123.04, BG 3	1,840	220	12.0
CT 124.03, BG 1	902	105	11.6
CT 124.03, BG 2	443	109	24.6
CT 127.00, BG 1	46	16	34.8
Study Area Total	**18,228**	**2,819**	**15.5**

Source: USCB 1999. Census 2000 Summary File (SF 3) Sample Data.

The percentages of residents within the study area census block groups who speak English "not well" or "not at all" range from 2.8 percent (CT 123.02, BG 1) to 34.8 percent (CT 127.00, BG 1). Limited English Proficiency persons were identified within the census block groups throughout the study area. According to *Census 2000* data, of the residents who speak English "not well" or "not at all" located in the study area, the predominant language spoken is Spanish. A field reconnaissance indicated English was the primary language used for building signage and other forms of posted information and advertisement along areas where impacts are likely to occur. Included were scattered areas of Spanish language signage, postings and advertisements in South Padre Island, Bayview, Port Isabel, Laguna Heights, and Laguna Vista.

3.2.1.7 Disabled Population

The USCB defines disability as a long-lasting physical, mental, or emotional condition. The condition can make it difficult for a person to do activities such as walking, climbing stairs, dressing, bathing, learning, or remembering. The condition can also impede a person from being able to go outside the home alone or to work at a job or business. As part of *Census 2000*, the USCB collected data from households regarding residents' disability status. The USCB categorizes types of disabilities among household residents five years of age or older. Disability types considered by the USCB include sensory disabilities, physical disabilities, mental disabilities, self-care disabilities, go-outside-home disabilities, and employment disabilities.

A comparison of the disabled population of the study area with those of Cameron County and surrounding communities reveals a lower proportion of disabled residents living in the study area as compared to Cameron County and the Town of Bayview but slightly higher when compared with the Town of Laguna Vista, the City of Port Isabel, and the City of South Padre Island. Similar proportions of disabled residents can be found in the Cities of Laguna Vista, Port Isabel, and South Padre Island. **Table 3-10** shows that for the study area and county – disabled populations generally consist of approximately 29 and 36 percent of the total population, respectively.

Table 3-10: Disabled Population (2000)

	Study Area	Cameron County	Town of Laguna Vista	City of Port Isabel	City of South Padre Island	Town of Bayview
Total Population*	19,864	335,227	1,658	4,865	2,422	323
Total Disabled Population	5,760	121,452	430	1,355	580	98
Percent of Total	*29.0*	*36.2*	*25.9*	*27.8*	*23.9*	*30.3*

Source: USCB 2000. Total Disabled Population - Census 2000 Summary File (SF 3) Sample Data.
**Total Population – Census 2000 Summary File (SF 1) 100-Percent Data.*

3.2.1.8 Community Cohesion

Communities within the proposed 2nd Access Project study area are characterized by varying degrees of cohesion. The FHWA defines community cohesion as patterns of behavior that individuals or groups of individuals hold in common. Residential subdivisions may develop a sense of community cohesion through social interaction or participation in neighborhood organizations. For instance, if a local church or school provides a location where residents of the neighborhood or community can assemble and associate with one another or a neighborhood association or neighborhood watch program is in place to serve the community and satisfy the residents' economic and social needs, then some sense of cohesion likely exists. Cohesion may also be based on a common characteristic of interest shared by the members of the community, such as religion, ethnicity or income level (FHWA 1996).

Schools, places of worship and community facilities are located within the study area. These facilities include those listed in **Table 3-11** and shown on **Exhibit 3-6**.

Table 3-11: Schools, Places of Worship and Community Facilities

COMMUNITY FACILITIES	
Port Isabel Community Center	142 Champion Ave., Port Isabel
Boys & Girls Club	190 Port Rd., Port Isabel
Port Isabel City Fire Dept.	204 S. Musina St., Port Isabel
Laguna Vista Fire Station	245 Santa Isabel Blvd, Port Isabel
Port Isabel Police Dept.	110 W. Hickman Ave., Port Isabel
Laguna Vista Police Dept.	122 Fernadez St., Laguna Vista
South Padre Island Police Dept.	4601 Padre Blvd., S Padre Island
SCHOOLS	
Derry Elementary	2nd and Oklahoma, Port Isabel
Garriga Elementary	200 W. Adams, Port Isabel
Laguna Madre Christian Academy	1441 Santa Isabel Blvd, Laguna Vista
Laguna Madre Christian Academy	107 E. Mesquite St., South Padre Island
Port Isabel High School	SH 100, Port Isabel
Port Isabel Head Start	216 E. Hockaday St., Port Isabel
Port Isabel Junior High	SH 100, Port Isabel
Laguna Heights Head Start	SH 100, Laguna Heights
Port Isabel School	SH 100, Port Isabel
PLACES OF WORSHIP	
Christ's Harbour Church	1441 Santa Isabel Blvd., Laguna Vista
Valley International Christian Center	723 Santa Isabel Blvd., Laguna Vista
First Baptist Church	300 E Ocean Blvd., Los Fresnos
Church of Christ	301 S. Tarnava St., Port Isabel
Fishers of Men Lutheran Church	603 S. Tarnava St., Port Isabel
Templo Maranatha	401 E. Madison St., Port Isabel
Our Lady Star of the Sea Catholic Church	705 S. Longoria St., Port Isabel
First United Methodist Church	101 W. Adams St., Port Isabel
Island Baptist Church	107 E. Mesquite St., South Padre Island
Witnesses of Jehovah's Kingdom Church	301 W. Monroe St., Port Isabel
First Baptist Church	Longoria and Washington, Port Isabel
Texas McAllen Mission Church	506 Marina Dr., Port Isabel
Christ Church	310 S. Tarnava St., Port Isabel
Iglesia Alfoi De Dios	214 E. Maxan Street, Port Isabel
St. Andrews Episcopal Church	1022 N Yturria St., Port Isabel
Chapel By The Sea	Isla Blanca Park, South Padre Island
Shoova Israel	106 W. Oleander, South Padre Island
Southwest Good Samaritan Church	28259 Pereira Compassion Road, Los Fresnos
Bethel Baptist Church	SH 100, Port Isabel
Lighthouse Assembly of God	110 Port Road, Port Isabel
DAY CARE FACILITIES	
Agustina Rivera	114 Palm Blvd., Laguna Vista
Esperanza B. Garza Head Start Child Development	131 W Garfield, Laguna Vista
Heavenly Angels	121 Roosevelt St.. Laguna Vista
Kids by the Bay	119 W. Monroe Street, Port Isabel
Maria Landa De Hernandez	1000 Hibiscus Dr., Laguna Vista
Port Isabel Head Start	216 E. Hockaday St., Port Isabel
Rise and Shine Learning Center	111 B W. Houston St., Port Isabel
Stepping Stones Learning Center	405 East Washington, Port Isabel

Community Linkages and Interaction

Although the individual communities within the 2nd Access Project study area form cohesive units among themselves, a number of social, economic, educational, institutional, and cultural linkages exist among these communities, specifically between the mainland and island, including the City of Port Isabel and the City of South Padre Island. In most cases, these linkages are based on the location of community facilities and the areas they serve in relation to other surrounding communities. In particular, strong linkages exist between the City of Port Isabel and the City of South Padre Island as a result of common facilities serving both communities but that are physically located in only one community and separated by the Laguna Madre.

Education

The 2nd Access Project study area is served by two public school districts. The Point Isabel Independent School District encompasses the majority of the study area in far eastern Cameron County. The Point Isabel Independent School District serves the City of South Padre Island, the City of Port Isabel, the Town of Laguna Vista, and the Laguna Heights community.

The Los Fresnos Consolidated Independent School District encompasses much of the northern and western portions of the 2nd Access Project study area. The Los Fresnos Consolidated Independent School District serves the Town of Bayview. The closest school facilities serving the Town of Bayview are located in the City of Los Fresnos.

Four schools serve the Point Isabel Independent School District and include Derry Elementary School, Garriga Elementary School, Port Isabel Junior High School, and Port Isabel High School. Derry and Garriga Elementary Schools are both located within the City of Port Isabel, while Port Isabel Junior High School and Port Isabel High School are both located in the Laguna Heights community. Because all four public schools associated with Point Isabel Independent School District are located on the mainland, students enrolled in the school district living in the City of South Padre Island must travel across the Laguna Madre to attend school. According to the Point Isabel Independent School District, students from the island attend the District's schools and travel to school by bus using the Queen Isabella Memorial Causeway on a daily basis during the school year. Additionally, activities associated with Point Isabel Independent School District schools such as athletics, school clubs, fine arts, and other school-sponsored organizations and activities involve students from mainland communities they serve as well as from the island.

Commerce and Employment

Linkages between the mainland and the island are apparent with regard to shopping opportunities and commerce. As stated by the City of Port Isabel Economic Development Corporation, "There appears to be some integrated economic relationship between these two communities and theirs may be a case of shared economies in a small area divided only by a 2.37 mile long bridge." This statement speaks to the economic interdependence of the City of Port Isabel and the City of South Padre Island.

According to the City of Port Isabel's City Manager, numerous City of South Padre Island residents rely on business establishments located in the City of Port Isabel for purchasing general merchandise items and groceries. The City of Port Isabel contains two large discount grocery stores, Walmart Supercenter and H-E-B Foods, while the City of South Padre Island contains one full service grocery store, the Blue Marlin Supermarket, which charges higher prices for products compared to grocery stores in Port Isabel. According to the City of Port Isabel's City Manager, numerous island residents make weekly trips to Port Isabel to shop for

groceries at either the Walmart Supercenter or the H-E-B Foods supermarket. The City of South Padre Island does not contain a large general merchandise store within its boundaries. However, the City of Port Isabel is home to a Walmart Supercenter and Dollar General Store, which both attract residents and long-term staying tourists from the City of South Padre Island to secure general household goods.

In addition to basic shopping needs, because the City of South Padre Island contains an abundance of lodging options compared to the City of Port Isabel, it is likely that tourists visiting the City of Port Isabel stay in accommodations in the City of South Padre Island, although the City of Port Isabel does contain a number of smaller lodging facilities. This relationship between the mainland and island also characterizes much of the labor market linkage between the mainland and Island. According to the City of Port Isabel Economic Development Corporation, numerous City of Port Isabel residents are employed by business establishments in the City of South Padre Island, which imports employees daily to fill the relative abundance of jobs on the island.

Health Care, Public, and Religious Facilities

No full service hospitals exist within the study area. Smaller public and private clinics serve the basic health care needs of study area residents and tourists. A number of general and special-purpose health care facilities exist in Port Isabel, Laguna Vista and South Padre Island. In Port Isabel, four facilities, including the PI Medical Clinic, the Port Isabel Health Clinic, a Cameron County Health Department office, and the Laguna Madre Rehabilitation Center collectively provide a multitude of services on which residents among all communities within the study area rely. The Port Isabel Health Clinic and PI Medical Clinic provide general and urgent outpatient ambulatory care to study area residents. The Cameron County Health Department office is the only publicly-funded facility devoted to health care in the study area to which nearby community and Island residents must travel to take advantage of its benefits. Services provided by the Cameron County Health Department include indigent health care services for those below the poverty level as well as immunization and services to children with special health care needs. The Laguna Madre Rehabilitation Center specializes in outpatient physical therapy services.

The City of South Padre Island contains a number of doctor's offices and special care services. The City of South Padre Island is also home to the South Padre Island Clinic, which offers general outpatient ambulatory and urgent care services. Laguna Vista is home to Laguna Vista Family Medical Clinic. Although there are a number of health care services and facilities on both the mainland and Island, mainland and island residents are likely to rely on services that traverse the confines of each community boundary. An example would be the public health services provided to eastern Cameron County and the study area by the Cameron County Health Department office in the City of Port Isabel. Residents of other nearby communities rely on this facility for indigent care and immunization, including residents of the City of South Padre Island.

Other public facilities in the study area include the Port Isabel Library, a State of Texas Office of Eligibility and Program Services, a Cameron County Constable office, and a Cameron County Tax Assessor office. These facilities serve both mainland and island residents and contribute to mainland and island interaction. The Town of Laguna Vista also contains a public library. Additionally, the City of South Padre Island is home to a Cameron County Parks Department office including a number of parks in the County's park system serving the study area, including and attracting visitors from the mainland.

Religious facilities within the study area vary geographically by denomination. Two religious facilities serve the City of South Padre Island, the Island Baptist Church and Shoova Israel. Religious facilities that are located near the City of Port Isabel and throughout the remainder of the 2nd Access Project study area represent Catholic, Lutheran, Methodist, Episcopal, and other denominations. A linkage between residents on the mainland and island likely exists as the majority of religious denominations and facilities are represented on the mainland.

3.2.2 Economic Conditions

3.2.2.1 Employment Characteristics

Cameron County's employment base expanded during 2007, adding 2,100 jobs or an approximate 1.7 percent increase in total employment. In 2007, there were approximately 123,000 Cameron County-based business employees. Health Care and Social Assistance, Educational Services, and the Retail Trade sectors play a large role in the Cameron County economy (**Table 3-12**). These three sectors account for more than 50 percent of Cameron County's current total employment, compared to 33.4 percent for Texas. Similar to regions within the State of Texas and the U.S. as a whole, the manufacturing sector has been in decline. Since 2000, the region has lost one-third of its manufacturing jobs.

Based on preliminary data for 2008, it appears Cameron County's employment base expanded by 1.2 percent or 1,500 jobs. It is still too early to measure the total effects of Hurricane Dolly (summer of 2008), but the negative effects on the tourism sector were likely partially offset by gains in the construction sector as rebuilding occurs.

Table 3-12: Cameron County Employment Trends by 2-Digit North American Industry Classification System

Description	2000	2006	2007	Change 2000-2007	Change 2006-2007
Agriculture, Forestry, Fishing & Hunting	1,308	971	878	-430	-93
Mining	30	48	55	25	7
Utilities	1,196	1,148	1,111	-85	-37
Construction	4,230	4,953	4,693	463	-260
Manufacturing	12,197	7,832	7,542	-4,656	-290
Wholesale Trade	3,528	3,350	3,248	-280	-102
Retail Trade	13,997	16,171	16,520	2,523	349
Transportation & Warehousing	4,535	4,657	5,043	509	386
Information	1,534	1,448	1,516	-18	68
Finance and Insurance	2,356	2,809	2,956	600	147
Real Estate & Rental and Leasing	1,778	1,830	1,838	61	9
Prof., Scientific, & Technical Services	2,023	2,138	2,199	177	62
Management Companies & Enterprises	46	273	224	178	-49
Administrative & Support Services	4,458	5,794	6,528	2,071	734
Educational Services	16,262	18,524	18,556	2,294	32
Health Care & Social Assistance	20,030	27,452	28,254	8,224	802
Arts, Entertainment, & Recreation	1,161	1,563	1,596	435	33
Accommodation and Food Services	9,582	10,663	11,120	1,537	456
Other Services	3,178	2,792	2,807	-371	15
Public Administration	5,600	6,399	6,377	777	-22
Unclassified	27	242	92	65	-150
Total Employment	**109,053**	**121,055**	**123,150**	**14,097**	**2,095**

Source: Proposed South Padre Island Second Access Project Economic Analysis, TXP, Inc. 2009

In 2007, approximately 123,150 Cameron County residents were employed. The difference between total Cameron County-based employment (the number of jobs at local businesses) and the number of employed residents would seem to indicate that job opportunities outside the county or across the border in Mexico attract a number of Cameron County workers. Hypothetically, if all Cameron County-based jobs were filled first by local residents, then approximately 10,875 residents would need to commute for work each day or be self-employed. A similar trend exists in Hidalgo County. According to data produced by the U.S. Bureau of Economic Analysis, approximately $21.9 million in net Cameron County earnings are derived from jobs outside of the County.

Within the County, total employment and overall job growth are concentrated near the large urban areas of Brownsville and Harlingen. Port Isabel and South Padre Island have experienced noticeable gains in overall employment over the past 5 years – mostly related to the tourism sector. According to information from the USCB County Business Patterns dataset, South Padre Island's non-government firms employ 3,500 workers. These estimates increase by 1,000 to 1,500 workers during the peak tourism season. This is approximately 50 percent larger than the Port Isabel employment base of 2,100 workers. It is worth noting, however, that the average Port Isabel job pays nearly 20 percent more than jobs on South Padre Island. This is because Accommodation/Food Services sector jobs do not pay high wages and are the majority of employment on the island.

Employee Residence

In 2006, approximately 3,500 study area residents were employed. At the same time, study area-based businesses employed 6,011 workers. Hypothetically, if all study area-based jobs were first filled by local residents, then approximately 2,500 workers would need to commute from throughout the Lower Rio Grande Valley. However, data from the USCB's Longitudinal Employer-Household Dynamics Program shows that in 2006, only 47.5 percent of study area residents worked in the study area (**Table 3-13**). Over 10 percent of study area working residents commuted to the City of Brownsville each day. Other large employment centers were the Cities of McAllen, Harlingen and Edinburg. The opposite trend exists for study area-based businesses (**Table 3-14**). In 2006, study area residents comprised 26 percent of total local employment. Nearly 30 percent of study area-based business employees lived in Brownsville, and 28.3 percent traveled from northern and western Cameron County.

Table 3-13: Where Employed Study Area Residents Work (2002-2006)

Description	2002 (percent)	2003 (percent)	2004 (percent)	2005 (percent)	2006 (percent)
South Padre Island	31.5	30.5	32.5	34.6	34.9
Port Isabel	9.4	10.8	10.7	10.6	10.8
Laguna Heights	3.3	1.9	3.5	2.9	1.8
Brownsville	12.2	11.4	10.7	11.4	11.8
Harlingen	5.0	4.6	3.8	4.5	3.3
Pharr	1.8	2.4	1.4	1.3	1.7
McAllen	8.0	8.5	8.3	7.9	8.9
Edinburg	2.8	2.5	2.3	1.8	2.3
Corpus Christi	1.2	1.8	1.4	1.8	1.6
Houston	1.7	1.6	1.7	1.9	1.6
All Other Locations	23.1	23.9	23.6	21.3	21.1

Source: Proposed South Padre Island Second Access Project Economic Analysis, TXP, Inc. 2009

Table 3-14: Where Study Area-Based Business Employees Live (2002-2006)

Description	2002 (percent)	2003 (percent)	2004 (percent)	2005 (percent)	2006 (percent)
South Padre Island	3.2	4.0	4.2	3.8	4.0
Port Isabel	9.2	7.8	11.3	11.9	12.2
Laguna Heights	1.4	1.7	2.6	4.2	3.3
Laguna Vista	5.5	5.9	6.1	6.3	6.5
Los Fresnos	3.8	3.6	3.2	3.6	3.6
Laureles	2.4	2.6	1.8	1.9	2.4
Brownsville	34.6	35.0	32.9	30.5	29.9
San Benito	1.6	1.7	1.8	1.7	2.0
Harlingen	3.5	3.8	3.5	3.7	3.5
McAllen	2.1	1.7	2.0	2.0	1.4
All Other Locations	32.6	32.1	30.7	30.6	31.2

Source: Proposed South Padre Island Second Access Project Economic Analysis, TXP, Inc. 2009

Job Growth and Unemployment Rate

As a result of the region's fast growing population base (those who are born and raised locally), Cameron County economic development officials are challenged with attracting, growing and retaining enough jobs for local residents. Even though Cameron County's employment growth rate (13.6 percent) exceeds the state average (9.8 percent), it is still slightly below the population growth rate. If this trend continues, the County's unemployment rate will remain high. In March 2010, according to the U.S. Bureau of Labor Statistics, Cameron County's monthly unemployment rate was 11 percent or slightly greater than one-third higher than for Texas at 8.2 percent. Because of the relatively small size of the municipalities within the study area, unemployment rate data are not available.

Study Area Commuting Pattern

According to the TXP Report, *Proposed South Padre Island Second Access Project Economic Analysis*, study area residents comprised 26 percent of total local employment in 2006. Nearly 30 percent of study area-based business employees lived in the City of Brownsville, and 28.3 percent traveled from northern and western Cameron County.

Rise in Offshore Energy Activity

Surging energy prices and domestic supply issues have prompted heightened interest in offshore drilling activity in the Gulf of Mexico. Near-term energy prices should stabilize after experiencing a dramatic rise and fall over the previous 12 to 18 months. The ports of both Port Isabel and Brownsville have benefited from these forces, and should see more growth in the years to come. This industry sector presents an opportunity for attracting higher paying jobs to the region over time.

3.2.3 Uniform Relocation Assistance and Real Property Acquisition Policies Act

To ensure that decent, safe and sanitary dwellings would be available to all affected residents, relocation assistance would be available to all those displaced as a result of the construction of the proposed action. Relocation assistance would be conducted in accordance with PL 96-146, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. Relocation resources would be made available to all individuals without discrimination and in accordance with the requirements of Title VI and the Department of Housing and Urban Development Amendment Act of 1974. Special relocation considerations would be made to accommodate residents in need of additional assistance. Last resort housing would also be available in the event of a housing shortage or for residents who cannot find comparable housing within their means. This may involve the use of replacement housing

payments that exceed the Uniform Relocation Assistance Act maximum amounts or the use of other methods of providing comparable decent, safe and sanitary housing within a person's financial means (Department of Housing and Urban Development 2005). Similar provisions in the Uniform Relocation Assistance Act apply to all businesses displaced by the proposed action. Refer to **Chapter 7** for a more detailed discussion of the relocation assistance process.

3.2.4 Community Conditions

Transportation investments have major influences on society and have the potential to impose economic and social consequences on communities in varying degrees. Due to the scale of the proposed project and the varying nature of community relationships within the Cameron County region (work, church, volunteer groups, sports groups, schools, etc.), the term "community" in the context of this assessment is defined by municipality. The following community profiles document the social and economic context of communities located within the 2nd Access Project study area and profile each of the community's conditions and goals based on demographic and economic data, as well as stakeholder input.

3.2.4.1 Town of Bayview

The Town of Bayview is an incorporated community and contains a total population of 323 residents, according to *Census 2000*. The median household income in the Town of Bayview is $46,750, compared to $39,927 for the state of Texas. The Town of Bayview encompasses 3.3 square miles and is located approximately 7.8 miles northwest of Laguna Vista and approximately 8.6 miles northeast of Los Fresnos. The Town of Bayview is generally situated along the Resaca de los Cuates. The Town of Bayview is only partially located within the proposed study area. None of the 11 reasonable alternatives traverse the boundaries of the Town of Bayview; however, Alternatives 1, 3, 4, 6, 8, and 10 would intersect FM 510 approximately 2.25 miles east of the Town of Bayview.

Demographically, the Town of Bayview is home to a larger retirement-age population than average for the state of Texas and Cameron County. According to *Census 2000*, the median age of Bayview residents is 40.7 years compared with 32.3 years for the state of Texas and 29.0 years for Cameron County. Additionally, according to *Census 2000*, 36.8 percent of Town of Bayview households receive social security income compared to 21.6 percent of households in Texas and 28.4 percent in Cameron County. However, the Town of Bayview is similar to Texas as a whole and generally lower than Cameron County when comparing its percentage of residents under the age of 18. According to *Census 2000*, 27.8 percent of residents in the Town of Bayview are under 18 years of age compared to 28.2 percent for the state of Texas and 33.8 percent for Cameron County. In 2000, according to the USCB, the Town of Bayview contained 137 housing units, of which 95.8 percent were owner-occupied and 4.2 percent were renter-occupied, indicating a very low rate of rental options within the community. *Census 2000* data also indicate that approximately 13.9 percent of housing units in the Town of Bayview are vacant. Housing in the Town of Bayview is exclusively comprised of single-family residential dwelling units.

Development within the Town of Bayview is historically limited to residential construction, and economically, the Town has functioned as a retirement destination as well as a bedroom community to surrounding job centers including Los Fresnos, Brownsville, and San Benito. The Town of Bayview can be characterized by large residential lots, many with small-scale citrus orchards, generally nestled along the Resaca de los Cuates. The Resaca de los Cuates continues to provide irrigation opportunities for the Town of Bayview's orchard uses and is integral in defining the nature of the largely waterfront community. The Town of Bayview retains

a legacy of land use and architectural controls that preserve its rural estate and agricultural heritage. According to the Town of Bayview's mayor, the Town's residents generally favor an exclusively residential community with large lots and large homes. The Town of Bayview's Zoning Ordinance requires minimum lot sizes of 1.5 acres and minimum single-family home sizes of 2,000 square feet, which indicates the Town's plan to retain its rural character.

3.2.4.2 City of Port Isabel

The City of Port Isabel is an incorporated community and contains a total population of 4,865, according to *Census 2000*. The median household income in the City of Port Isabel is $25,323, compared to $39,927 for the state of Texas and $26,155 for Cameron County. Therefore, City of Port Isabel residents' income levels are generally lower than for most communities in the state of Texas as well as many surrounding communities. The City of Port Isabel encompasses 2.9 square miles and is located on the western edge of the Laguna Madre, approximately 2.5 miles west of South Padre Island. None of the 11 reasonable alternatives traverse the boundaries of the City of Port Isabel. Currently, the City of Port Isabel contains the western terminus of the Queen Isabella Memorial Causeway, the only vehicular connection between the mainland and the island, which traverses the Laguna Madre and connects the City of Port Isabel to the City of South Padre Island. Major thoroughfares serving the City of Port Isabel include SH 100 and SH 48.

Demographically, the City of Port Isabel is similar to Texas as a whole and slightly variable from Cameron County. According to *Census 2000*, the median age of City of Port Isabel residents is 32.0 years compared with 32.3 for the state of Texas and 29.0 years for Cameron County. The City of Port Isabel has a slightly higher percentage of residents under the age of 18 at 30.4 percent when compared to the state of Texas at 28.2 percent but lower when compared with Cameron County at 33.8 percent. Additionally, according to *Census 2000*, 30.6 percent of City of Port Isabel households receive social security income compared to 21.6 percent of households in the state of Texas and 28.4 percent for Cameron County, indicating a greater than average abundance of retirees. In 2000, according to the USCB, the City of Port Isabel contained 2,057 housing units, of which 60.0 percent were owner-occupied and 40.0 percent were renter-occupied. *Census 2000* data also indicate that approximately 19.7 percent of housing units in the City of Port Isabel are vacant. Single-family dwelling units account for 52.0 percent of housing composition in the City of Port Isabel, multi-family dwelling units account for approximately 30.0 percent, and other housing arrangements account for approximately 18 percent.

According to the City of Port Isabel Economic Development Corporation, the City of Port Isabel was established as a small fishing village. The City was incorporated in 1928 and adopted the slogan, "Building a City where a City belongs." Since its incorporation, the City of Port Isabel emphasized capitalizing on its location and progressing as a tourist area. The completion of infrastructure improvements after incorporation, including street paving and canal construction, converted the City of Port Isabel into a viable tourist destination and welcomed tourist-oriented business development. Throughout much of the 1900s, the City of Port Isabel depended economically on shrimping and has slowly transitioned into an economy dependent on tourism. Today, a multitude of historic, recreational, and cultural amenities in Port Isabel attract thousands of tourists. These include the Port Isabel Lighthouse, constructed in 1853; the Bahia Grande Wetland Restoration Project; and numerous local museums and ecotourism opportunities.

According to the Texas Comptroller of Public Accounts, for fiscal year 2003-2004, industry within the City of Port Isabel is most concentrated in retail trade (approximately 89.0 percent), with wholesale trade and services accounting for 3.8 percent and 3.5 percent, respectively. Much of the City of Port Isabel's retail and service sectors can be attributed to its progress of establishing itself as a tourist destination. The *Town of South Padre Island Comprehensive Plan*, in comparing trends in retail trade between the City of Port Isabel and the City of South Padre Island, states that from 1995-2005, taxable retail sales in the City of Port Isabel increased 98 percent, while the City of South Padre Island experienced a taxable retail sales increase of 36 percent. The *Plan* also states that the number of retail establishments in the City of Port Isabel increased slightly over the same time period from 123 to 131 establishments, while in the City of South Padre Island, the total number of retail establishments declined from 222 to 181.

According to the City of Port Isabel's City Manager, in harmony with the City's establishment and development as a center of tourism, it is the City's goal to become a more unique community within the geographic context of the surrounding region. It is also the City of Port Isabel's goal to expand its market capture area and capitalize on reigning in additional demand for basic goods and services from surrounding communities, including the City of South Padre Island. The City of Port Isabel's planning and development endeavors generally involve balancing the effects of high quality and progressive development with attention to preserving the natural environment and the historic and cultural heritage of the community. It is also a goal of the City of Port Isabel to provide continual maintenance to city streets and major thoroughfares to enhance the mobility of residents and visitors to the community. According to the City of Port Isabel Economic Development Corporation, the Queen Isabella Memorial Causeway serves 690,000 vehicles per month, funneling numerous tourists through the City. The City of Port Isabel's City Manager states that a reduction in traffic congestion and improved accessibility and mobility would help advance the City's goal of capitalizing on its establishment as a unique tourist destination.

3.2.4.3 Town of Laguna Vista

The Town of Laguna Vista is an incorporated community and contains a total population of 1,658 residents, according to *Census 2000*. The median household income in the Town of Laguna Vista is $43,641, compared to $39,927 for the state of Texas and $26,155 for Cameron County. The Town of Laguna Vista encompasses 2.2 square miles and is located on the western edge of the Laguna Madre approximately 5.9 miles northwest of the City of Port Isabel. Five of the proposed reasonable alternatives traverse the far northwestern portion of the Town of Laguna Vista, including Alternatives 2, 5, 7, 9, and 11. These reasonable alternatives intersect FM 510 just west of the South Padre Island Golf Club/Community. Currently, the Town of Laguna Vista is served by SH 100, which traverses the southern portion of the Town, and FM 510, which serves as the Town's main thoroughfare.

Demographically, the Town of Laguna Vista is similar to other communities in Texas and slightly variable from Cameron County. According to *Census 2000*, the Town's median age is 33.0 years compared with 32.3 years for the state of Texas and 29.0 for Cameron County. Additionally, according to *Census 2000*, 22.6 percent of Town of Laguna Vista households receive social security income compared to 21.6 percent of households in the state of Texas and 28.4 percent for Cameron County. Residents under the age of 18 account for 30.6 percent of the Town of Laguna Vista's population compared to 29.8 percent for Texas and 33.8 percent for Cameron County. In 2000, according to the USCB, the Town of Laguna Vista contained 715 housing units, of which 71.5 percent were owner-occupied and 28.5 percent were renter-occupied, indicating a lower rate of rental opportunities when compared with Texas as a whole,

which holds a rental occupancy rate of 36.2 percent. *Census 2000* data also indicate that approximately 18.0 percent of housing units in the Town Laguna Vista are vacant. Single-family dwelling units account for approximately 64.5 percent of housing composition in the Town of Laguna Vista, and multi-family dwelling units account for approximately 35.5 percent.

Economically, the Town of Laguna Vista functions largely as a bedroom community with a small number of businesses catering to local residents. The vast majority of the Town is comprised of residential uses. The Town is heavily dependent on surrounding communities for employment as well as its location along the western edge of the Laguna Madre as an amenity-rich, resort-like community.

A major planning and development goal for the Town of Laguna Vista provided by the Town's City Manager is transitioning from a general-law municipality with limited land use planning and annexation authority to a home-rule municipality as prescribed in the Texas Local Government Code. Other goals include establishing and retaining co-functional commercial development and optimizing the use of all available land within the Town's boundaries and newly annexed areas. The transition from a general-law municipality to a home-rule municipality would provide the Town of Laguna Vista with more municipal authority under Texas state law. The most substantial benefit of such a transition is the ability for the Town to annex land more easily. A major goal of the Town of Laguna Vista is to eventually annex northward to include the land where the proposed bridge landing for the 2nd Access Project ties into the mainland on the western side of the Laguna Madre in the old Holly Beach area. Laguna Vista's City Manager states that such an annexation would allow the Town of Laguna Vista to plan and accommodate additional residential and commercial development and augment its tax base to better serve Town residents and provide additional community amenities.

3.2.4.4 City of South Padre Island

The City of South Padre Island is an incorporated community and contains a population of 2,422 residents, according to *Census 2000*. The median household income in the City of South Padre Island is $45,417, compared to $39,927 for the state of Texas and $26,155 for Cameron County. The City of South Padre Island encompasses a total of 1.9 square miles and is located approximately 2.5 miles east of the City of Port Isabel on the eastern edge of the Laguna Madre. All of the 11 reasonable alternatives traverse the boundaries of the City of South Padre Island. Reasonable Alternatives 8, 9, 10, and 11 cross the Laguna Madre from the mainland and tie directly into the far northern portion of the City of South Padre Island while Alternatives 1, 2, 3, 4, 5, 6, and 7 cross the Laguna Madre from the mainland and tie into South Padre Island north of the Town's municipal boundaries and follow the existing Park Road 100 southward into the northern portion of the Town.

Demographically, the City of South Padre Island is home to an older and somewhat more transient population than surrounding communities and most communities elsewhere in Texas. According to *Census 2000*, the median age of City of South Padre Island residents is 47.0 years compared with 32.3 years for the state of Texas and 29.0 years for Cameron County. Additionally, according to *Census 2000*, 28.9 percent of City of South Padre Island households receive social security income compared to 21.6 percent of households in Texas and 28.4 percent in Cameron County. The City of South Padre Island has a substantially lower percentage of residents under the age of 18 at 12.9 percent when compared to Texas at 28.2 percent and Cameron County at 33.8 percent, according to *Census 2000*. These data indicate that the City of South Padre Island likely demands fewer services and amenities for younger populations and more services and amenities for older populations.

In 2000, according to the USCB, the City of South Padre Island contained 4,653 housing units, which is greater than the Town's population. Of these, only 26.1 percent were occupied as principal residences, meaning occupants reside in those units most of the year. The remaining 73.9 percent of the City of South Padre Island's housing units indicate the transient nature of the community's population and that the majority of homeowners in the community do not reside in the Town for most of the year. Of the year-round occupied housing units in the City of South Padre Island, according to *Census 2000*, 64.7 percent are owner-occupied, while 35.3 percent are renter-occupied. Single-family dwelling units account for only 15.3 percent of housing composition in the City of South Padre Island, and multi-family dwelling units account for 84.7 percent. Therefore, the City of South Padre Island contains a much higher residential development density than surrounding communities.

Economically, the City of South Padre Island is dependent on tourism. According to the *Town of South Padre Island Comprehensive Plan*, 56 percent of all private sector jobs on the island are attributed to the Accommodations and Food Services (hotels and restaurants) sector. An additional 15 percent of private sector jobs are attributed to retail trade. Because the majority of jobs on the Island are concentrated in the Accommodations and Food Services sector and the majority of associated jobs are low-wage, the *Town of South Padre Island Comprehensive Plan* states that the average annual payroll per private sector employee on the Island is $14,789, compared to $20,497 countywide and $36,161 statewide. From 1995-2005, taxable retail sales in the City of South Padre Island increased by 36 percent, compared to 98 percent for the City of Port Isabel.

Planning and development goals for the City of South Padre Island include developing a year-round economy with increased residents and tourists; supporting an environment friendly to residents, tourists, and businesses; and improved causeway access to the Island. According to the City of South Padre Island's Planner, it is also a major goal of the Town to obtain home-rule authority as a municipality to make it easier for the Town to annex land north of the Town in unincorporated Cameron County to take advantage of and support development potential in areas near and adjacent to the proposed 2nd Access bridge landing.

3.2.4.5 Holly Beach and Laguna Heights

Laguna Heights and Holly Beach are both named unincorporated areas of Cameron County with no formal organization or municipal central government directing land uses or providing services to residents. According to the *Handbook of Texas Online*, Holly Beach was an unincorporated seaside community located north of FM 510 approximately seven miles northwest of the City of Port Isabel. Holly Beach is no longer an inhabited community, and therefore, a profile of Holly Beach is not provided in this document. Laguna Heights is an inhabited community, but is governed by no formal municipal government. Therefore, little community-specific information is available for Laguna Heights. For the purposes of comparison, a demographic profile is provided for Laguna Heights based on data available from the USCB for the Laguna Heights census-designated place, a census geography that encompasses and is coextensive with the unincorporated community of Laguna Heights.

According to *Census 2000*, Laguna Heights contains a total population of 1,990 residents. The median household income in Laguna Heights is $18,083, compared to $39,927 for the state of Texas and $26,155 for Cameron County. The Laguna Heights census-designated place encompasses a total of 0.3 square miles and is located approximately 2.0 miles northwest of the City of Port Isabel and approximately 2.5 miles southeast of the Town of Laguna Vista. Laguna Heights is situated along the western shore of the Laguna Madre and is traversed by SH 100,

which serves as its main thoroughfare. None of the 11 reasonable alternatives traverse the boundaries of the Laguna Heights census-designated place.

Demographically, Laguna Heights contains a relatively young population with few retirement-age residents. According to *Census 2000*, the median age of Laguna Heights residents is 25 years, compared with 32.3 years for the state of Texas and 29.0 years in Cameron County. Additionally, 37.5 percent of residents in Laguna Heights are under the age of 18 compared to 28.3 percent for the state of Texas and 33.8 percent for Cameron County. According to *Census 2000*, 16.8 percent of households in Laguna Vista receive social security income compared to 21.6 percent of households in the state of Texas and 28.4 percent in Cameron County, indicating a lower than average abundance of retirees. *Census 2000* data reveal that in 2000, the Laguna Heights census-designated place contained 556 housing units, of which approximately 57.1 percent were owner-occupied and approximately 42.9 percent were renter-occupied. *Census 2000* data also indicate that approximately 7.0 percent of housing units in Laguna Heights are vacant. Single-family dwelling units account for approximately 80.0 percent of housing composition in the Laguna Heights census-designated place, almost half of which are mobile homes, while multi-family dwelling units account for approximately 18.9 percent of housing composition, according to *Census 2000*. Other housing arrangements account for the remaining approximately 0.1 percent of dwelling units.

Although formal information related to the economy of Laguna Heights is unavailable because Laguna Heights is an unincorporated community, the nature of Laguna Heights's economy can be inferred from the combination of age, income, and housing information as provided by *Census 2000*. Because of Laguna Heights's relatively low median age and low median household income, it is likely that Laguna Heights is a bedroom community for low-wage service sector employees who commute to the City of Port Isabel and the City of South Padre Island for work. *Census 2000* data indicate that approximately 74.7 percent of workers residing in the Laguna Heights census-designated place commute 10 minutes or longer to get to work. It is also evident from *Census 2000* data that Laguna Heights contains a large composition of rental housing, suggesting a lower income and more transient population than surrounding communities.

3.3 EXISTING NOISE ENVIRONMENT

This analysis was accomplished in accordance with TxDOT's (FHWA approved) *Guidelines for Analysis and Abatement of Roadway Traffic Noise* (2011).

This section generally describes the methodology for determining traffic noise levels in the proposed 2nd Access Project study area and identifies the major sources contributing to those noise levels.

Existing sources of noise in the study area include area roadways, commercial and industrial developments, recreation and commercial boating traffic and an airport. Presently the predominant noise generators in the proposed 2nd Access Project study area are vehicular traffic along existing roadways (SH 100, FM 510, Buena Vista Drive, Park Road 100, SH 48, etc.).

Sound from highway traffic is generated primarily from a vehicle's tires, engine and exhaust. It is commonly measured in decibels and is expressed as "dB."

Sound occurs over a wide range of frequencies. However, not all frequencies are detectable by

the human ear; therefore, an adjustment is made to the high and low frequencies to approximate the way an average person hears traffic sounds. This adjustment is called A-weighting and is expressed as "dB(A)."

Also, because traffic sound levels are never constant due to the changing number, type and speed of vehicles, a single value is used to represent the average or equivalent sound level and is expressed as "Leq."

The traffic noise analysis typically includes the following elements:

- Identification of land use activity areas that might be impacted by traffic noise.
- Determination of existing noise levels.
- Prediction of future noise levels.
- Identification of possible noise impacts.
- Consideration and evaluation of measures to reduce noise impacts.

The FHWA has established the following Noise Abatement Criteria (NAC) for various land use activity areas that are used as one of two means to determine when a traffic noise impact would occur (**Table 3-15**).

Table 3-15: FHWA Noise Abatement Criteria

Activity Category	FHWA dB(A) Leq	TxDOT dB(A) Leq	Description of Land Use Activity Areas
A	57 (exterior)	56 (exterior)	Lands on which serenity and quiet are of extra-ordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	66 (exterior)	Residential
C	67 (exterior)	66 (exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools , television studios, trails, and trail crossings
D	52 (interior)	51 (interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E	72 (exterior)	71 (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in A-D or F.
F	--	--	Agricultural, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	--	--	Undeveloped lands that are not permitted.

NOTE: primary consideration is given to exterior areas (Category A, B, C, or E) where frequent human activity occurs. However, interior areas (Category D) are used if exterior areas are physically shielded from the roadway, or if there is little or no human activity in exterior areas adjacent to the roadway.

A noise impact occurs when either the absolute or relative criterion is met:

Absolute criterion: the predicted noise level at a receiver approaches, equals or exceeds the NAC. "Approach" is defined as one dB(A) below the NAC. For example: a noise impact would occur at a Category B residence if the noise level is predicted to be 66 dB(A) or above.

Relative criterion: the predicted noise level substantially exceeds the existing noise level at a receiver even though the predicted noise level does not approach, equal or exceed the NAC. "Substantially exceeds" is defined as more than 10 dB(A). For example: a noise impact would occur at a Category B residence if the existing level is 54 dB(A) and the predicted level is 65 dB(A).

When a traffic noise impact occurs, noise abatement measures must be considered. A noise abatement measure is any positive action taken to reduce the impact of traffic noise on an activity area.

Noise sensitive receivers within the study area include schools, places of worship, public parks/recreation areas, and residential. Residential uses within the study area consist of single-family residential subdivisions, scattered single-family homes and condominiums. Residential land uses on the west side of the study area include scattered single-family homes and two single-family residential subdivisions [Las Palmas Villas and South Padre Island Golf Club/Community (currently under development), located near FM 510 in Laguna Vista. The Shores of South Padre Island which is a master planned community of residences, townhouses and condominiums, is located along Park Road 100 in South Padre Island. Approximately 74 percent of the residential properties, including single-family homes, multi-family homes and condominiums, located within the City of South Padre Island are considered vacant as these consist of vacation properties.

Based on the above described existing land uses, the study area can be categorized under noise abatement criteria categories G (undeveloped lands that are not permitted), B and C. Existing noise levels at four receivers representing the land uses within the proposed 2nd Access Project study area were measured in 2009. Short-term noise measurements of 20 minute duration were conducted at four noise monitoring sites using a Quest Technologies 2900 Integrating and Logging Sound Level Meter. Simultaneous traffic counts were recorded, if applicable, at each site. The existing noise levels representing land uses within the study area ranged between 44 dBA and 52 dBA. The locations of the short-term noise measurement sites (ST-1, ST-2, ST-3 and ST-4) are displayed in **Exhibit 4-14**.

3.4 CLIMATE AND AIR QUALITY

In order to protect human health and the environment, the Clean Air Act of 1970 mandated the establishment of the National Ambient Air Quality Standards (NAAQS) and regulations to reduce air pollutants. When the pollutant level within an area exceeds the NAAQS, the EPA designates the area as "nonattainment" for the pollutant. In addition, the EPA also develops regulations to reduce air pollutants from specific sources, including both industry and motor vehicles.

As previously mentioned, areas determined by the EPA to exceed a NAAQS are designated as nonattainment areas. The NAAQS include: ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, lead and Particulate Matter (PM-2.5 and PM-10).

This section describes the climate and atmospheric conditions found along the Texas Gulf Coast and their relationship to air quality in the region. It also discusses the EPA standards for air quality, the NAAQS and the region's compliance with those standards. Finally, this section identifies the quality of the air in the proposed 2nd Access Project study area based on the Texas Commission on Environmental Quality (TCEQ) Office of Air Quality regional ambient conditions.

Air quality is regulated nationally by the EPA. The EPA delegates authority to the TCEQ Office of Air Quality for monitoring and enforcing air quality regulations in Texas. The TCEQ can delegate some authority to local municipalities having air quality control agencies. The proposed 2nd Access Project is located in Cameron County, which does not have an air quality control agency.

In compliance with the federal Clean Air Act of 1970 and the Clean Air Act Amendments of 1977 and 1990, the EPA promulgated and adopted the NAAQS to protect public health, safety and welfare from known or anticipated effects of six pollutants. These six air pollutants have been identified by the EPA as criteria pollutants of concern nationwide and are carbon monoxide, nitrogen dioxide, ozone, PM, sulfur dioxides and lead.

3.4.1 Climate and Atmospheric Conditions along the Texas Gulf Coast

The study area has generally been described as a modified marine climate that is subtropical subhumid. Prevailing winds are southeasterly with the exception of northern winds occurring during strong winter fronts extending into the area. Annual precipitation for the study area averages 26.9 inches and occurs primarily in the spring and fall, often in the form of thunderstorms where a single event can make up the entire month's precipitation. Freezing temperatures rarely occur within the study area and the growing season for the area approaches 365 days per year. The average winter low temperature for the study area is 48 degrees Fahrenheit and the average summer high is 97 degrees Fahrenheit. Based on information from the National Weather Service's National Hurricane Center, the study area is located within the Atlantic Hurricane Basin, and during a typical year an average of 11 named tropical systems are produced which have the potential to affect the South Texas Gulf Coast.

3.4.2 Relevant Pollutants

The primary air pollutant for transportation-related projects is carbon monoxide. Carbon monoxide emissions result from the operation of internal combustion engines and are generally more pronounced in the immediate vicinity of the project, such as within the project ROW. Emissions of carbon monoxide from motor vehicles are affected by both temperature and speed and may be roughly twice as high in winter months as in summer months. An ambient carbon monoxide concentration range of 0.4 to 0.5 part per million is typical for most rural and suburban areas. The TCEQ has established continuous air monitoring stations located throughout the state that monitor air quality in Texas. These sites measure different parameters such as, but not limited to, carbon monoxide, nitric oxides, nitrogen dioxide and ozone. Two continuous air monitoring stations are located in Cameron County, C80 and C323, which are located at 344 Porter Drive in Brownsville and at Isla Blanca Park in South Padre, respectively.

As required by the Clean Air Act Amendments, the EPA reevaluates the NAAQS every 5 years. Local municipalities, as well as the TCEQ, may adopt more stringent air quality standards than the EPA. The TCEQ, and the counties within the study area, observes the EPA's NAAQS. Refer to **Table 3-16** for a list of the NAAQS.

Table 3-16: NAAQS

Pollutant	Primary Standards*		Secondary Standards**	
	Level	Averaging Time	Level	Averaging Time
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hr: Not to be exceeded more than once per year.	None	
	35 ppm (40 mg/m^3)	1-hr: Not to be exceeded more than once per year.		
Lead	0.15 $\mu g/m^3$ (Final rule signed on October 15, 2008.)	Rolling 3-month average	Same as Primary	
	1.5 $\mu g/m^3$	Quarterly average	Same as Primary	
Nitrogen Dioxide	0.053 ppm (100 $\mu g/m^3$)	Annual (arithmetic mean)	Same as Primary	
	0.100 ppm	1-hr: To attain this standard, the 3-yr average of the 98th percentile of the daily maximum 1-hr average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).	None	
Particulate Matter (PM10)	150 $\mu g/m^3$	24-hr: Not to be exceeded more than once per year on average over 3 years.	Same as Primary	
Particulate Matter (PM2.5)	15.0 $\mu g/m^3$	Annual (arithmetic mean): To attain this standard, the 3-yr average of the weighted annual mean $PM^{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 $\mu g/m^3$.	Same as Primary	
	35 $\mu g/m^3$	24-hr: To attain this standard, the 3-yr average of the 98th percentile of 24-hr concentrations at each population-oriented monitor within an area must not exceed 35 $\mu g/m^3$ (effective December 17, 2006).	Same as Primary	
Ozone	0.075 ppm (2008 std)	8-hr: To attain this standard, the 3-yr average of the fourth-highest daily maximum 8-hr average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008).	Same as Primary	
	0.08 ppm (1997 standard)	8-hr: (a) To attain this standard, the 3-yr average of the fourth-highest daily maximum 8-hr average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm. (b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard. (c) EPA is in the process of reconsidering these standards (set in March 2008).	Same as Primary	
	0.12 ppm	1-hr: (a) EPA revoked the 1-hr ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding"). (b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is < 1	Same as Primary	
Sulfur Dioxide	0.03 ppm	Annual (arithmetic mean)	0.5 ppm (1300 $\mu g/m^3$)	3-hr: Not to be exceeded more than once per year.
	0.14 ppm	24-hr: Not to be exceeded more than once per year.		
	0.075 ppm	To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed .075 ppm (Final rule signed June 2, 2010)	None	

Source: EPA http://www.epa.gov/air/criteria.html
*Primary NAAQS: the levels of air quality that the EPA judges necessary, with an adequate margin of safety, to protect the public health.
**Secondary NAAQS: the levels of air quality that the EPA judges necessary to protect the public welfare from any known or anticipated adverse effects.
ppm: parts per million, $\mu g/m^3$: Micrograms per cubic meter, mg/m^3: Milligrams per cubic meter

The NAAQS pollutants, as reported by the EPA (2009), include ozone, lead, carbon monoxide, sulfur dioxide, nitrogen dioxide and particulate matter. These are discussed in the sections below.

3.4.2.1 Ozone

Ozone is not emitted directly into the air but is formed through chemical reactions between precursor emissions of volatile organic compounds and nitrogen oxides in the presence of sunlight. Both volatile organic compounds and nitrogen oxides are emitted by transportation and industrial sources. Volatile organic compounds are emitted from sources as diverse as automobiles, chemical manufacturing, dry cleaners, paint shops and other sources using solvents.

3.4.2.2 Lead

The main sources of lead emissions are lead gasoline additives, non-ferrous smelters and battery plants. Emissions from on-road vehicles decreased 99 percent between 1970 and 1995 due primarily to the use of unleaded gasoline. Additional reduction of lead emissions are anticipated as a result of the EPA's Multimedia Lead Strategy issued in February 1991.

3.4.2.3 Carbon Monoxide

The largest source of carbon monoxide emissions comes from motor vehicle exhaust. This explains why high concentrations of carbon monoxide generally occur in areas of heavy traffic congestion. In some cities, as much as 95 percent of all carbon monoxide emissions emanate from automobile exhaust.

3.4.2.4 Sulfur Dioxide

Sources of sulfur dioxide result largely from stationary sources such as coal and oil combustion, steel mills, refineries, pulp and paper mills and from nonferrous smelters.

3.4.2.5 Nitrogen Dioxide

The two major emissions sources of nitrogen dioxide are transportation and stationary fuel combustion sources such as electric utility and industrial boilers.

3.4.2.6 Particulate Matter (PM-10 and PM-2.5)

Particulate matter (i.e., dust, dirt, soot, smoke and liquid droplets) are directly emitted into the air by sources such as factories, power plants, cars, construction activities, fires and natural windblown dust.

3.4.3 Regional Compliance

The proposed 2nd Access Project is located in Cameron County, which is in attainment of all NAAQS; therefore, the transportation conformity rule does not apply. Local planning documents prepared for the project area emphasize the need for increased mobility and economic development of the region. The proposed project is included in the *Town of South Padre Island, Texas, Comprehensive Plan* (Town of South Padre 2008) and the *Cameron County Regional Mobility Authority Strategic Plan, 2007-2011* (**Appendix C**) (Cameron County Regional Mobility Authority 2006).

The proposed project is not located within an urbanized area or within the boundaries of a Metropolitan Planning Organization; therefore, it is not included in a Metropolitan Transportation Plan. Because the project is currently unfunded and planned for letting beyond the current Statewide Transportation Improvement Program timeframe, the project is not currently included in the *FY 2011-2014 Statewide Transportation Improvement Program*. However, it is anticipated that the proposed project would be included in a future Statewide Transportation Improvement Program.

3.4.4 Traffic Air Quality Analysis

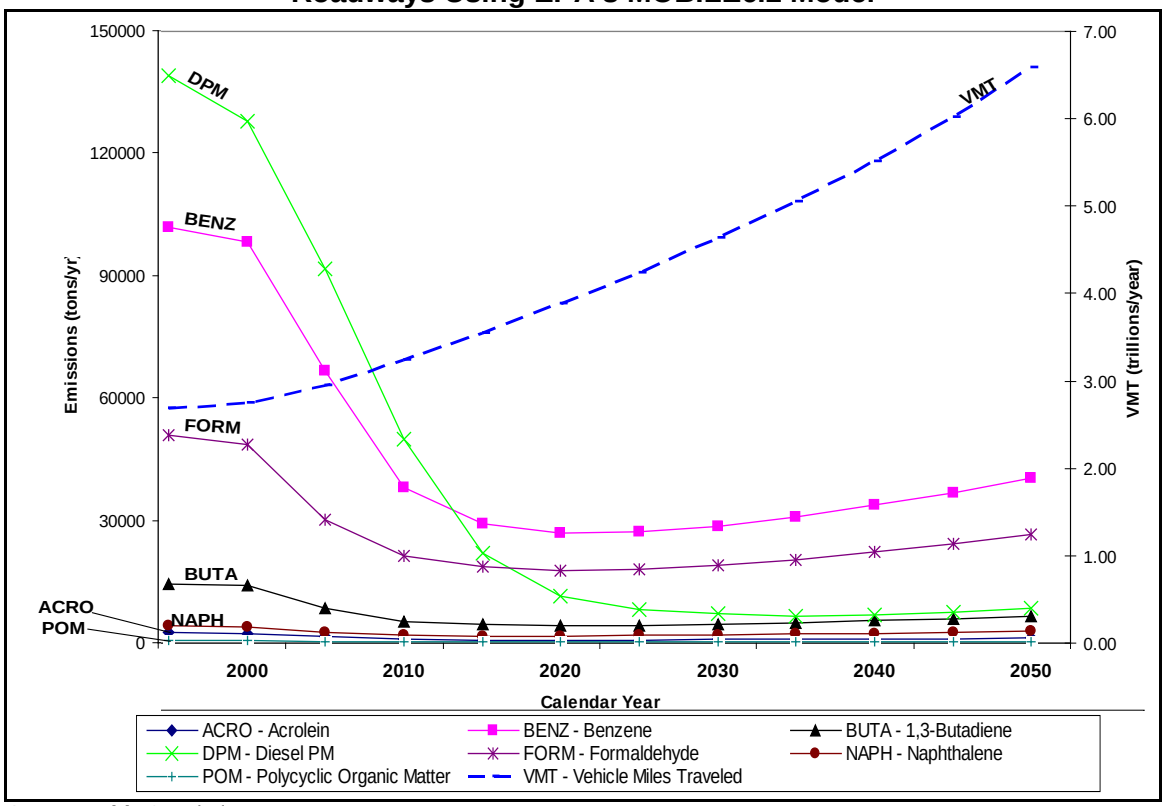
Traffic data for the design year (2036) is projected to be 26,550 vehicles per day. A prior TxDOT modeling study demonstrated that it is unlikely that a carbon monoxide standard would ever be exceeded as a result of any project with an average daily traffic below 140,000 vehicles per day. The average daily traffic projections for the project do not exceed 140,000 vehicles per day; therefore, a Traffic Air Quality Analysis was not required.

3.4.5 Mobile Source Air Toxics (MSATs)

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments of 1990, whereby Congress mandated that EPA regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007) and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (http://www.epa.gov/ncea/iris/index.html). In addition, EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (http://www.epa.gov/ttn/atw/nata1999/). These are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority MSAT, the list is subject to change and may be adjusted in consideration of future EPA rules.

The 2007 EPA MSAT rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using EPA's MOBILE6.2 model, even if vehicle activity (vehicle-miles travelled, VMT) increases by 145 percent as assumed, a combined reduction of 72 percent in the total annual emission rate for the priority MSAT is projected from 1999 to 2050, as shown in **Figure 3-1** and **Table 3-17**.

Figure 3-1: National MSAT Emission Trends 1999-2050 for Vehicles Operating on Roadways Using EPA's MOBILE6.2 Model



Source: **Table 3-17** below.
Note:
(1) Annual emissions of polycyclic organic matter are projected to be 561 tons/yr for 1999, decreasing to 373 tons/yr for 2050.
(2) Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors

Table 3-17: Projected National MSAT Emissions and Percent Reduction for 1999-2050 for Vehicles Operating on Roadways Using EPA's MOBILE6.2 Model

Pollutant/VMT	Pollutant Emissions (tons) and Vehicle-Miles Traveled (VMT) by Calendar Year							Reduction
	1999	2000	2010	2020	2030	2040	2050	1999 to 2050
Acrolein	2570	2430	1000	775	824	970	1160	-55%
Benzene	102000	98400	38000	27000	28700	33900	40500	-60%
1,3-Butadiene	14400	14100	5410	4360	4630	5460	6520	-55%
Diesel PM	139000	128000	50000	11400	7080	7070	8440	-94%
Formaldehyde	50900	48800	21400	17800	19000	22400	26800	-47%
Naphthalene	4150	4030	1990	1780	2030	2400	2870	-31%
Polycyclic Organic Matter	561	541	259	233	265	313	373	-33%
Trillions VMT	2.69	2.75	3.24	3.88	4.63	5.51	6.58	145%

Source: EPA. MOBILE6.2 Model run 20 August 2009

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how the potential

health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA. The FHWA, EPA, the Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this emerging field.

3.5 GEOLOGY AND SOILS

3.5.1 Physiographic Setting

According to the *Soil Survey of Cameron County, Texas*, the geologic surface of the county is Beaumont Formation of Pleistocene age with Holocene (younger) sediments overlying it. The landscape of the county contains depressions, tidal flats, levees, point bars, back swamps, meander belts, barrier islands and an old subdelta of the Rio Grande. The younger sedimentary units are divided into deposits of beach sand, fluvial deposits and modified fluvial deposits. Beach sand deposits occur on barrier islands and are deposited by wave and current action which is then altered by wind action into dune complexes. Fluvial deposits on levees, point bars and back swamps are from the youngest meandering belt of the Rio Grande where sedimentary bedding is preserved. While modified fluvial deposits are found in the old subdelta and tidal flats, eolian deposition has resulted in clay dune formation.

3.5.2 Geology

The geologic units within the study area are composed of unlithified packages of sediment that dip toward the Gulf of Mexico. Only the Pleistocene age Beaumont Formation and the overlying Holocene sediments are exposed within the study area.

At the end of the Pleistocene, approximately 18,000 to 21,000 years ago, sea level was approximately 300–500 feet lower than the current sea level and the Texas shoreline was located approximately 50 miles east of its present location. During this time, the Rio Grande and streams associated with present day Baffin Bay and the Land-Cut area eroded deep valleys as they flowed to the Pleistocene shoreline. The end of the final glaciation period marked the end of the Pleistocene Epoch. Sediment filled the deep valleys as the sea levels rose in response to the melting glaciers and the shoreline transgressed inland. Approximately 4,500 to 5,000 years ago, sea level was approximately 15 feet below present levels and sand bars and shoals began developing along the Gulf Coast. Approximately 2,500 years ago when the sea level reached its current level, bars and shoals formed the existing barrier islands, including Padre Island found along the Texas Coast.

Over the last several millennia, hurricanes, tropical storms and predominant gulf winds have transported sediment into the Laguna Madre resulting in the formation of tidal flats on the lagoonal side of the island. In contrast, wind-formed tidal flats on the mainland side of the Laguna Madre are caused by shoreline deflation, or wind erosion to the water table, whereby sediment is dislodged and blown inland. This process formed a land bridge, the Land-Cut area, connecting Padre Island with the mainland in the early 19th century. This geologic process continues today in the study area.

3.5.2.1 Characteristics of Geology Units in the Study Area

The geologic units that occur within the study area reflect the erosional processes that have occurred since the Pleistocene Epoch (**Exhibit 3-7**). Excluding areas designated as water (44,715.88 acres) or spoils (1,849.16 acres), alluvial formations cover a majority of the study

area. All six geological formations that occur within the study area are composed of alluvial or windblown sediments. **Table 3-18** identifies and describes the areal extent of the six units.

Table 3-18: Geological Formations Within Study Area

Symbol	Formation	Total Acres
Qal	Alluvium, undivided	7,294.23
Qas	Alluvium, dominated by silt and sand	27,544.79
Qac	Alluvium in Rio Grande; subdivided into areas of predominantly clay	15,391.91
Qbr	Barrier Ridge and Barrier Flat Deposits	2,076.15
Qcd	Clay dune and clay-sand dune deposits	2,304.13
Qbv	In Rio Grande delta area; clay veneer over meander belt sand	312.00

Source: USGS 2005

Alluvium, Undivided (Qal)

The youngest geologic unit in the study area is Quaternary Alluvium, undivided (Qal). Qal consists of floodplain deposits of the lower course of the Rio Grande and tidal flats. This unit is composed of sediments deposited in meander cutoffs, abandoned channels, point bars and back swamps. The unit consists of clay, silt, sand, gravel and organic matter. The silt and clay is calcareous and dark gray to dark brown and the sand is primarily quartz. The composition of the gravel includes sedimentary rocks of the Cretaceous and Tertiary and a wide variety of igneous and sedimentary rocks from the Trans-Pecos, Mexico and New Mexico that were shed from the ancestral Rocky Mountains. Gravel in the smaller tributaries of the Rio Grande is comprised primarily of Tertiary rocks derived from Uvalde Gravel.

Alluvium, Dominated by Silt and Sand (Qas)

Qas is a subdivision of Qal in which the sediments consist primarily of silt and sand. Qas occurs throughout the mainland portion of the study area often bordering Qal.

Alluvium in Rio Grande; Subdivided into Areas of Predominantly Clay (Qac)

Qac is made up of floodplain and back swamp silt and clay, dark-gray to dark-brown or brownish-gray silt, clay and silty clay. It contains minor amounts of medium to fine quartz sand and interdistributary fine sediment of the Rio Grande delta. Mostly inactive; deposition occurs during floods that accompany large, relatively infrequent tropical storms. This unit is burrowed by animals; locally very organic with abundant plant fragments and is extensively cultivated. Overlies older distributary sand deposits.

Barrier Ridge and Barrier Flat Deposits (Qbr)

Qbr is made up of sand, silt and clay; mostly sand, well sorted, fine grained, shells and shell fragments; interfingers with silt and clay in landward direction; includes beach ridge, spit, tidal channel, tidal flats, washover fan and sand dune deposits. It is often made up of beach sand and shells with subordinate feldspar, rock fragments and heavy minerals. Shell fragments form lag concentrations in places, for example on Padre Island near lat 27-deg 12 min where opposing longshore drift currents converge; on Little Shell Beach shells of the surf clam Donax (0.5-2 centimeters) are abundant; on Big Shell Beach, abraded bivalve shells (1-4 centimeters), mostly Eontia, Mercenaria and Echinochama and account for as much as 80 percent of the sediment. This unit underlies beaches, spits and barrier bars along coast. Upper shoreface deposits exhibit diagnostic hummocky-swaley bedding and are commonly burrowed by shrimp. Additionally, this unit also includes vegetated sand of back-barrier flats and back-island dune fields.

Clay Dune and Clay-Sand Dune Deposits (Qcd)

Clay dunes and clay-sand dunes (Qcd) are formed by blowing clay particles accumulating downwind of sub-aerially exposed areas such as mud and salt flats. Clay dunes are a unique depositional feature and the areal quality of the dunes is more extensive in the South Texas region than anywhere else in the world. Within the study area, the clay dunes are even-topped, ridge-shaped eolian deposits located on the northwest side of tidal and salt flats. The elongated dunes typically form ridges between 5–30 feet in height. The clay dunes grow throughout the dry portion of the year and during droughts when sub-aerial exposure is maximized. The growth of the dunes ceases during the periods of precipitation and the dunes erode during heavy precipitation events, tropical storms and hurricanes.

In Rio Grande Delta Area; Clay Veneer over Meander Belt Sand (Qbv)

Qbv is the oldest geologic formation in the study area, and is a part of the Beaumont Formation. Sediments were deposited during the last interglacial periods. The Qbv Formation consists of floodplain deposits made up of mud veneer over fluvial meander belt sands. The formation consists of interfingering beds of clay with interspersed sand and gravel. Pedogenic concretions and accumulations of calcium carbonate (caliche) and concretions of iron oxide and iron-manganese oxides are found throughout the formation representing ancient and modern soil horizons.

Fill and Spoil (Fs)

Fill material is dredge for raising land surface above alluvium and barrier island deposits and for creating lands. Spoil is dredge material forming islands along waterways. The areas are highly variable, mixed mud, silt, sand and shells. Mud and silt will winnow when re-worked.

Water

The Laguna Madre is located in between the mainland and South Padre Island. The Laguna Madre is a hypersaline lagoon; this indicates that it is usually much saltier than the ocean, due to being nearly landlocked in a semiarid environment, and is one of only six known hypersaline lagoons on earth. Its salinity generally increases from south to north, with distance from its major inlet near Port Isabel. Its salinity can vary wildly depending on rainfall and freshwater inflow, from as high as 12 percent – over three times saltier than the ocean – to as low as 0.2 percent after a heavy rain.

3.5.2.2 Relationship of Geology and Groundwater

Most of the groundwater in Cameron County, including the study area, is brackish. The proposed 2nd Access Project study area does not occur over any major or minor freshwater aquifers. The nearest freshwater aquifer to the study area is the Gulf Coast Aquifer which parallels most of the Gulf of Mexico. However, in Cameron County, the Gulf Coast Aquifer recedes inland underlying approximately 7–22 miles of the western portions of the county. Although no appreciable freshwater aquifer resources occur, several wells and test wells have been drilled within the study area. These wells have tapped into shallow barrier island deposits of freshwater or deeper saline groundwater deposits.

3.5.3 Mineral and Energy Resources

Mineral and energy resources are chiefly limited to natural gas deposits found in the Laguna Madre and the mainland portions of the study area.

3.5.4 Soils

This section describes the soils found in the study area according to their functions in the ecosystem, their economic value and their utility or limitations associated with the construction, operation and maintenance of the proposed roadway facility. It also lists the dominant soil associations and identifies the extent of prime and other important soils found in the study area.

3.5.4.1 General Soil Attributes

Soils are weathered residues formed on preexisting substrates by biophysical processes through time. Soils, as defined here, support plant life and serve as microbial active media that store and cycle water, organic materials, nutrients and other chemicals. Soils are of great importance. They support vascular plants and constitute environmental buffers that lessen the effects of various processes including interactions among the atmosphere, hydrosphere, biosphere and underlying geologic substrates.

Soils are highly diverse in the proposed study area. This is a result of the several factors that interact to produce a given soil. These factors include bedrock, climate, terrain and biota (most obviously plants, but also animals and the vast unseen contributions of microbes). These factors interact through time to produce the varied soils that occur at the land surface.

3.5.4.2 Soil Associations in the Study Area

The surface deposits contained within the study area range from generally level to gently sloping, moderately permeable to slowly permeable, saline, clayey and loamy soils of coastal areas to nearly level to steep, rapidly permeable, sandy soils of coastal areas. The dominant soil association mapped throughout the proposed study area is the Sejita-Lomalta-Barrada association. Four other soil associations found in the proposed study area are the Laredo-Lomalta association, Laredo-Olmito association, Harlingen-Benito association and the Mustang-Coastal dunes association.

The Sejita-Lomalta-Barrada association consists of areas of saline, loamy and clayey soils at or near sea level and broad areas of barren clay that are inundated by high tides and heavy rains. This association makes up about 23 percent of the county and the majority of the study area, mostly on the mainland and to the west of the Laguna Madre. It is comprised of roughly 31 percent Sejita soils, 29 percent Lomalta soils, 24 percent Barrada soils and 16 percent soils of minor extent. Soils in this association are used for range and wildlife habitat. In the majority of this association, the high water table is at a depth of 1–5 feet throughout the year. Barrada soils are barren.

The Laredo-Lomalta association is mainly in and adjacent to the LANWR. It consists mostly of nearly level to gently sloping saline Laredo soils at an elevation of about 1–5 feet above the slightly depressional Lomalta soils. This association comprises about four percent of the county. It is about 45 percent Laredo soils, about 27 percent Lomalta soils and 28 percent soils of minor extent. The soils in this association are used for range and wildlife habitat. A small acreage is dry farmed. The seasonal high water table is at a depth of 2–6 feet. This association has a medium potential for the production of forage.

The Laredo-Olmito association typically follows the pattern of the old resacas on a low terrace of the Rio Grande. Laredo soils occupy the higher, well-drained areas adjacent to the resacas, and Olmito soils occupy the level or slightly concave areas away from but parallel to the resacas. This association makes up about 19 percent of Cameron County. This association is

about 65 percent Laredo soils, 20 percent Olmito soils and about 15 percent soils of minor extent. The soils in this association are used mainly for irrigated crops. This association has a high potential for the production of most of the major crops commonly grown in the county. Laredo soils are suited to citrus trees.

The Harlingen-Benito association occupies broad areas of slightly depressed areas that lack adequate surface drainage and are mostly flooded for several days after heavy rains. Benito soils are in slightly lower areas than Harlingen soils. This association makes up about 8 percent of the county. It is about 45 percent Harlingen soils, 40 percent Benito soils and 15 percent soils of minor extent. The soils in this association are used mainly for irrigated crops and improved pasture. A small acreage is dry farmed. The soils are moderately to severely saline. The water table is generally below a depth of 5 feet. This association has a low potential for the production of a few of the major crops commonly grown in the county. Crop selection is restricted to those in which salt tolerance is medium or high.

The Mustang-Coastal dunes association is in a long narrow band along the Gulf Coast. It is separated from the mainland by the shallow water of the Laguna Madre. It consists of active to partly stabilized windblown sands that are as much as 30 feet above sea level and that are on the eastern or gulf side of the islands. The Mustang soils are in a broad area 2–5 feet above mean high tide and extend from the dunes westward to the Laguna Madre. This association is one of the most important associations in the country for present and potential use for recreation.

3.5.4.3 Prime and Other Important Farmland Soils

The Farmland Protection Policy Act, as detailed in Subtitle I of Title XV of the Agricultural and Food Act of 1981, provides protection to prime and unique farmlands, as well as farmlands of statewide or local importance. Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, feed, forage and oilseed crops. Such soils have properties that are favorable for the production of sustained high yields. Prime farmland soils typically produce the highest yields with a minimum input of energy and economic resources and farming these soils has been found to keep damage to the environment at a minimum. Prime farmland soils usually exist where adequate precipitation is available, and where mean temperature and length of growing season are favorable. The pH level of prime soils is neither extremely acidic nor extremely alkaline. These soils are fairly permeable to water and air, contain very few rocks and are not excessively erodible by wind or water. Prime soils are not saturated for long periods, nor are they subject to frequent flooding during the growing season. Slopes are generally less than 6 percent. Prime farmland can include cropland, pastureland, rangeland or forestland, but does not include land converted or dedicated to urban, industrial, transportation or water uses. Statewide and locally important farmlands are defined by the appropriate state or local agency as important for the production of food, feed, fiber, forage or oilseed crops. Unique farmlands are not recognized by the Natural Resources Conservation Service (NRCS) in the State of Texas.

Prime farmland soils occupy a relatively small portion of the northwestern corner of the study area. The soils that are associated with prime farmlands within the study area are Laredo silty clay loam, 0–1 percent slopes (LAA); Olmito silty clay (OM); Harlingen clay (HA); Laredo silty clay loam, 1–3 percent slopes (LAB); Laredo-Olmito complex (LD); Toicano clay (TC); and Cameron silty clay (CE). **Table 3-19** below identifies the acreages of prime farmland soils within the study area (**Exhibit 3-8**).

Table 3-19: Prime Farmland Soils

Soil Map Unit	Acres Within Study Area	Percent of Study Area
LAA	4204.50	4.1
OM	3151.15	3.1
HA	1981.39	1.9
LAB	649.50	0.6
LD	146.26	0.1
TC	33.72	0.03
CE	14.62	<0.01

Source: NRCS 2009

3.6 WATER RESOURCES

The lower Laguna Madre dominates the surface water resources of the study area, occupying approximately 207,750 acres. The Laguna Madre is considered a hypersaline lagoon; this indicates that it is usually much saltier than the ocean, due to being nearly landlocked in a semiarid environment. Its salinity generally increases from south to north, with distance from its major inlet near Port Isabel. Its salinity can vary wildly depending on rainfall and freshwater inflow, from as high as 12 percent – over three times saltier than the ocean – to as low as 0.2 percent after a heavy rain. The average water depth in the Laguna Madre is 2.5 feet with some areas as deep as 7 feet. Variable depths and salinity support five species of seagrasses, hyper-saline marshes and algal flats. The Laguna Madre is one of only six known hypersaline lagoons on earth, and the only one in the United States. Laguna Madre water quality is recognized as a critical factor in the integrity of this ecosystem; monitoring water quality in the Laguna Madre is a LANWR management objective. Inputs from the Arroyo Colorado watershed affect Laguna Madre water quality; the Arroyo Colorado Watershed Protection Plan (2007) includes 10-year pollutant load reduction goals for pollutants from agriculture and municipal wastewater discharge.

Additionally, the Laguna Madre is an important essential fish habitat breeding ground and sport fishing location. Despite salinity fluctuations inherent in the Laguna Madre, it is known as an extremely productive bay fisheries system; total economic input from sport fishing in the Laguna Madre was $67.7 million in 1987 (TWDB). For many aquatic birds, it acts as a wintering and stopover area for numerous species. The extremely shallow seagrass areas also provide excellent feeding grounds for winter duck populations; the Laguna Madre is the largest red-headed duck wintering area in the world (80% of the population winter here)and is home to 80% of the remaining Texas seagrass habitat.

In the summer months, the Laguna Madre acts as a nursery area for young brown shrimp. Skipjacks, pinfish, broad killifish and striped mullet forage in the shoal grass areas, along with mollusks and crustaceans, which are generally associated with the areas of underwater vegetation and are important as waterfowl food.

3.6.1 Surface Water

The Texas Surface Water Quality Standards apply to all surface water features in the state. These standards are enumerated in Title 30, Chapter 307 of the Texas Administrative Code. The standards were approved by the EPA in accordance with Section 303 of the Clean Water Act and, as required by the statute, are updated every 3 years. The standards are typically designed to protect the most sensitive beneficial use within a water body. The TCEQ distributes

the information provided by the Texas Surface Water Quality Standards and administers compliance with the standards. Five general categories for water use are defined in the Texas Surface Water Quality Standards: aquatic life use, contact recreation, general use, public water supply and fish consumption.

The TCEQ carries out a regular program of monitoring and assessment to compare conditions in Texas surface waters to established standards and to determine which water bodies are meeting the standards. The results of the assessment are published periodically in the Texas Water Quality Inventory and Section 303(d) List (List of Impaired Surface Waters), as required by Sections 305(b) and 303(d) of the Clean Water Act. The Texas Water Quality Inventory and 303(d) List is an overview of the status of surface waters of the state, including concerns for public health, fitness for use by aquatic species and other wildlife and specific pollutants and their possible sources.

As a result of this assessment, the state of Texas must develop action plans to remediate those water bodies that are impaired through the development of a total maximum daily load which determines the maximum amount of pollutants that a water body can receive and still both attain and maintain its water quality standards and which allocates this allowable amount (load to point and non-point sources in the watershed). The TCEQ monitoring program divides the state's surface water into river basin data and further divides this data into specific segments which are each allocated a segment identification number.

The proposed project is located within the boundaries Phase II (small) Municipal Separate Storm Sewer System, and would comply with applicable MS4 requirements.

3.6.1.1 Surface Drainage Characteristics

The proposed study area is located in the paleo-floodplains of the Rio Grande. The U.S. Geological Survey 7.5-minute topographic map of the La Coma, Port Isabel, Port Isabel NW and Laguna Vista Quadrangles indicate the study area varies in elevation between approximately 15 feet above mean sea level to approximately 5 feet above mean sea level (**Exhibit 3-9**). Generally, all surface water drains to the Laguna Madre and the Gulf of Mexico.

3.6.1.2 Water Quality in Surface Streams

According to the 2010 Texas Section 303(d) List, the classified segments located within the proposed 2nd Access Project study area include the Laguna Madre (SegID 2491), Laguna Madre Oyster Waters (SegID 2491OW), drainage ditches flowing into segment 2491 (SegID 2491A), South Bay (SegID 2493), South Bay Oyster Waters (SegID 2493OW), Port Isabel Fishing Harbor (SegID 2494A), the Gulf of Mexico (SegID 2501), and South Padre Island Recreational Beaches (SegID 2501SP). With the exception of the Port Isabel Fishing Harbor and the Gulf of Mexico, the water bodies within the study area are in attainment for their designated uses. The Port Isabel Fishing Harbor, between the Laguna Madre confluence to 0.25 mile south of SH 100 in Port Isabel, contains elevated levels of bacterial. The Gulf of Mexico, in the Port Isabel area and the area between Port Mansfield and Port Isabel, does not meet the fish consumption use due to elevated levels of mercury in edible tissue.

3.6.1.3 Floodplains

The floodplain assessment follows the guidance of FHWA's Technical Advisory T 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (FHWA 1997). The assessment methodology is based on the requirements provided in Executive Order

11988 Floodplain Management, the *Federal-Aid Highway Program Manual 6-7-3-2*, Location and Hydraulic Design of Encroachments on Floodplains, and U.S. Department of Transportation 5650.2 Floodplain Management and Protection. The *Federal-Aid Highway Program Manual 6-7-3-2* essentially references 23 Code of Federal Regulations (CFR) Section 650 Subpart A, Location and Hydraulic Design of Encroachments on Floodplains. The floodplain regulations require that a Location Hydraulics Study be performed to address and discuss the following items for each of the build alternatives:

- The risk of flooding associated with the implementation of the highway facility;
- The impacts on natural and beneficial floodplain values;
- The support of incompatible development within the floodplain; and
- Measures to minimize floodplain encroachments.

Floodplain regulations also require the utilization of Federal Emergency Management Agency (FEMA) National Flood Insurance Program maps to identify the limits of the base (100-year) floodplain. The National Flood Insurance Program was established by FEMA and is administered and enforced through communities affected by floodplains. The intent of these regulations is to avoid or minimize transportation encroachments within the base floodplain, where practicable and to avoid supporting land use development that is incompatible with floodplain values. Sections 60.3(c), 65.3, 65.6 and 65.12 of FEMA's National Flood Insurance Program and related regulations, revised October 1, 2005, specify that "The cumulative effect of the proposed development, when combined with all other existing and anticipated development in this area, would not increase the water surface elevation of the base flood more than 1 foot at any point within the community" (44 CFR 60.3[d][3]).

Executive Order 11988 seeks to avoid adverse impacts associated with the use and modification of floodplains and to avoid direct or indirect support of floodplain development. This order directs federal agencies to evaluate the potential effects of its actions on floodplains. For actions located in a regulatory floodplain, the agency is required to consider alternatives to avoid adverse effects and incompatible development.

In accordance with 23 CFR Section 650 Subpart A – Location and Hydraulic Design of Encroachment on Flood Plains, FEMA administers the National Flood Insurance Program, of which Cameron County, the City of Port Isabel, the City of South Padre Island and the Village of Laguna Vista participate. The design studies required by Subpart A "apply to all encroachments and to all actions which affect base flood plains." Therefore, in order to determine the extent of the floodplains and regulatory floodways within the study area, Federal Insurance Rate Maps (480101 01000, 480101 02000, 480101 0275C, 485483 00010, 480115 0001C, 480109 0001B and 480101 03750) were assessed.

Exhibit 3-10 indicates that most of the study area is located in areas designated as lying within the 100-year floodplain, as defined by the most current National Flood Insurance Program maps and geographic information system data from FEMA. The 100-year floodplain elevation in the project area is approximately 11 feet above mean sea level.

3.6.2 Groundwater

Most of the groundwater in Cameron County, including the study area, is brackish. Specifically, the proposed 2nd Access Project study area does not occur over any major or minor freshwater aquifers. The nearest freshwater aquifer to the study area is the Gulf Coast Aquifer which parallels most of the Gulf of Mexico. However, in Cameron County, the Gulf Coast Aquifer

recedes inland underlying approximately 7–22 miles of the western portion of the county (**Exhibit 3-11**). Although no appreciable freshwater aquifer resources occur, several wells and test wells have been drilled within the study area (**Table 3-20**). These wells have tapped into shallow barrier island deposits of freshwater or deeper saline groundwater deposits.

Table 3-20: Groundwater Wells

Well Number	Owner	Date Drilled	Use	Depth (feet)	Surface Elevation (feet)	Location
8863601	R.E. McCaslin	1948	Domestic	5	9	southwest of SH 100 and Padre Boulevard (Park Road 100)
8854401	Cramer-Thompson	8/8/1952	Irrigation/Salty	1,999	19	1 mile north northwest of Buena Vista Road and General Brant Highway
8855801	Laguna Madre Water District	11/19/1996	Test Hole	50	5	130 yards southeast of White Sands Road and Park Road 100
8855802	Laguna Madre Water District	11/20/1996	Test Hole	25	5	155 yards southeast of White Sands Road and Park Road 100
8863301	Laguna Madre Water District	12/31/1996	Test Hole	45	5	60 yards east of Corral Street and Gulf Boulevard

Source: Texas Water Development Board Groundwater Database 2009

3.6.3 Wetlands and Other Waters of the U.S.

3.6.3.1 Regulatory Overview

Executive Order 11990 (Protection of Wetlands) established a national policy "to avoid to the extent possible, the long and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative." The FHWA Technical Advisory T 6640.8A (FHWA, 1987) provides guidelines for addressing wetland impacts in environmental documents, including the identification of the extent of wetlands impacted, their type, quality and function. Alternatives for avoidance and practicable measures to minimize harm to wetlands should be addressed. The relative importance of the wetland resource, its function within the area and any uniqueness that may contribute to the wetland's importance should be presented.

The term "waters of the U.S." has broad meaning and incorporates both deepwater aquatic habitats and special aquatic sites, including wetlands, as listed below:

- The territorial seas with respect to the discharge of fill material;
- Coastal and inland waters, lakes, rivers and streams that are navigable waters of the U.S., including their adjacent wetlands;
- Tributaries to navigable waters of the U.S., including adjacent wetlands; and
- Interstate waters and their tributaries, including adjacent wetlands.

Jurisdictional wetlands (i.e., wetlands that are subject to permitting under Section 404 of the Clean Water Act, as discussed below) are transitional areas between terrestrial and aquatic systems that are inundated or saturated by surface or ground water at a duration and frequency sufficient to support a prevalence of hydrophytic vegetation and anaerobic soil conditions under normal circumstances. Jurisdictional wetlands are determined by the *1987 Corps of Engineers Wetlands Delineation Manual* and the *Interim Regional Supplement to the Corps of Engineers*

Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (January 2008) according to three criteria: 1) the presence of hydrophytic vegetation; 2) hydric soil characteristics; and 3) wetland hydrology.

Federal mandates have been issued requiring project review and mitigation (when necessary) for projects that impact wetlands and other waters of the U.S. under Section 404 of the Clean Water Act. The Secretary of the Army, through the Chief of Engineers, issues permits for the discharge of dredged or fill materials into waters of the U.S., including wetlands. The U.S. Army Corps of Engineers (USACE) also issues permits under Section 10 of the Rivers and Harbors Act of 1899 (also 33 USC 403), for filling, dredging and construction in certain waters of the U.S. Section 9 of the Rivers and Harbors Act (also 33 USC 114/115) requires coordination with the U.S. Coast Guard before constructing or modifying a bridge structure crossing over a navigable waterway.

When the Section 404 permitting process is initiated for an individual permit, several federal agencies automatically become involved. The EPA maintains program oversight (over the USACE) and makes final determinations as to the extent of Clean Water Act jurisdiction. The Fish and Wildlife Coordination Act (also 48 Stat. 401 as amended 16 USC 661 et seq.) mandates review of Section 404 Permits by the USFWS and/or the National Oceanic and Atmospheric Administration (NOAA) Fisheries.

3.6.3.2 Potential Wetlands and Other Jurisdictional Waters

This section provides a brief regional overview of the potential wetlands occurring within the proposed 2nd Access Project study area and the methodology by which they were identified.

Coastal wetlands are usually associated with estuaries and line the rivers and bays that drain into the Gulf of Mexico. Coastal wetlands on the Texas Gulf Coast perform many important functions. These functions include the following:

- Water quality: wetland plants and soils clean the water before it goes into groundwater or larger surface waters;
- Nurseries: coastal near-shore wetlands serve as important nursery sites for fish and shellfish;
- Wildlife habitat: Texas coastal wetlands provide a home for many different wildlife species and provide migratory birds a stopover location or winter home;
- Flood buffers: wetlands reduce the severity of floods by acting as a natural detention area;
- Erosion control: vegetation within wetlands stabilizes banks and reduces shoreline erosion; and
- Recreation: fishing, hunting and birding are economically important recreation activities that take place in wetlands.

In general, wetland resources can be classified using the Cowardin system. This system differentiates wetland types on the basis of ecological systems, subsystems and classes. Systems are broad groupings of wetland habitats which share similar hydrology, geomorphology, chemistry and biological characteristics. The major systems include marine, estuarine, riverine, lacustrine and palustrine. These terms are generally defined by the Cowardin system as follows:

Marine : includes wetlands occurring along coasts. Water levels rise and fall with the daily tides; can be subject to the force of waves and storms, and to ocean currents. Marine wetlands vary

with the level of tidal, wave and current affects. Subtidal marine wetlands are submerged continuously; intertidal marine wetlands are periodically exposed.

Estuarine: includes wetlands within estuaries (where fresh and salt water mix). Estuarine wetlands usually have some access to oceans, with significant inflows of freshwater. Characteristics vary with the level of tidal, wave and amount of salinity, which can vary with location and interactions with oceans and freshwater sources. Subtidal estuarine wetlands are submerged continuously; intertidal estuarine wetlands are periodically exposed. Mangrove swamps are considered estuarine wetlands.

Riverine: includes wetlands and deepwater habitats contained within a channel, except those wetlands 1) dominated by trees, shrubs, persistent emergents, emergent mosses or lichens and 2) which have habitats with ocean-derived salinities in excess of 500 part per million.

Lacustrine: those wetlands and deepwater habitats exceeding 20 acres in size with less than 30 percent areal vegetation cover.

Palustrine: includes all non-tidal wetlands dominated by persistent hydric vegetation and includes non-vegetated wetlands less than 20 acres in size which are not riverine. Examples include marshes, swamps, bogs and wet prairies.

The potential wetland features discussed here are based on the USFWS system, as developed by Cowardin, et al., in 1979, and mapped on National Wetland Inventory (NWI) maps. It should be pointed out that the NWI classification system is not the same as the system developed by the USACE and the EPA for determination of jurisdictional wetlands under Section 404. However, the NWI maps provide a good first estimate of the number, type and extent of features that may qualify as potentially jurisdictional wetlands.

The National Agricultural Imagery Program 2008 1-meter aerial photographs from the Texas Natural Resources Information System, National Wetland Inventory (NWI) maps, published soil survey maps, and geographic information system data from the Texas General Land Office were analyzed and used to identify and confirm the location and extent of potential wetland resources within the study area. Limited field verification of the occurrence of potential wetlands was then conducted, where access was available, to further assess the resource. Jurisdictional wetland field determinations and delineations would be performed following the determination of a recommended preferred alternative.

The potential wetland features identified within the proposed 2nd Access Project study area, using the protocol described above, are shown on **Exhibit 3-12**. Potential wetlands and other waters of the U.S. occur in various sizes within the proposed 2nd Access Project study area. Most obvious features are associated with the Laguna Madre. **Table 3-21** identifies the potential wetlands and other jurisdictional waters within the study area.

Table 3-21: Potentially Jurisdictional Wetlands and Other Jurisdictional Waters Within Study Area

Potential Wetland or Other Jurisdictional Water	Area Within Study area (acres)
Estuarine and Marine Deepwater	58,781.41
Estuarine and Marine Wetland	10,554.90
Freshwater Emergent Wetland	6,150.97
Freshwater Forested/Shrub Wetland	70.79
Freshwater Pond	318.84
Lake	2,766.89
Other	305.57
Total	**78,949.37**

Source: Texas Natural Resource Information System 2009; U.S. Fish and Wildlife Service National Wetland Inventory Maps 2009m

3.7 ECOLOGICAL RESOURCES

This section provides a description of the ecological resources within the study area. The following information is derived from recorded information sources such as private and governmental literature and color, infrared or black and white aerial photography, as well as from general reconnaissance-level field surveys and subsequent ecological analyses. Reference maps utilized in the investigation and analyses include U.S. Geological Survey 7.5 minute topographic quadrangles, USFWS NWI maps (USFWS 2009m), NRCS Soil Surveys (U.S. Department of Agriculture 1977), the Geologic Atlas of Texas (Brewton, et al. 1976), the Vegetation Types of Texas (McMahan, et al. 1984) and various project maps. Reconnaissance-level field investigations were conducted to collect more detailed baseline information and to ground-truth ecological conditions represented in the base references described above.

3.7.1 Regulatory Authority

The Texas Gulf Coast is a highly regulated area. Dominant regulated habitats include seagrass beds, tidal flats, coastal wetlands, dunes and open water. Agencies with regulatory authority over the habitats of the Gulf Coast region of Texas include the USACE, USFWS, NOAA Fisheries Service, Texas General Land Office and TPWD.

3.7.1.1 TxDOT-Texas Parks and Wildlife Department Memorandum of Understanding

Provision (4)(A)(i) of the 1998 Memorandum of Understanding between TxDOT and the Texas Parks and Wildlife Department (TPWD) requires that the vegetation and habitat for the proposed project be characterized, as defined by Sections 1, 2 and 3 of the 2001 TxDOT-TPWD Memorandum of Agreement, and the impact to vegetation described.

Section 1 of the TxDOT-TPWD Memorandum of Agreement requires the description of unusual vegetation and special habitat features. Unusual vegetation features include unmaintained, fence line and riparian vegetation; trees that are unusually larger than other trees in the area; and unusual stands or islands of vegetation. Special habitat features include bottomland hardwoods, caves, cliffs and bluffs, native prairies, ponds, seeps or springs, snags, water bodies (creeks, streams, rivers, lakes, etc.), and existing bridges with known or easily observed bird or bat colonies.

In accordance with Provision (4)(A)(ii) of the TxDOT/TPWD Memorandum of Understanding, the TxDOT/TPWD Memorandum of Agreement identifies non-regulatory habitats that TxDOT would consider mitigating should the project impact the habitats. These habitats include:

- any habitat for federal candidate species if mitigation would prevent the listing of the species;
- S3 vegetation series that provide habitat for state listed species;
- S1 and S2 vegetation series;
- native prairies and riparian sites; and
- any other habitat feature considered to be locally important.

S1 communities are critically imperiled in the state, extremely rare and very vulnerable to extirpation. S2 communities are imperiled in the state, very rare and vulnerable to extirpation. S3 communities are rare or uncommon in the state.

3.7.1.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 states it is unlawful to kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, or egg in part or in whole, without a federal permit issued in accordance with the Act's policies and regulations.

South Padre Island is an important migratory bird fallout area for trans-gulf migratory birds from southern Mexico and Central America. The island is the first landfall for these neotropical and neoarctic birds and provides critical resting and feeding habitats. The dense brushland and rangeland provide nesting habitat for migratory birds. Tidal flats provide important nesting habitat for ground-nesting species, including two plover species, black-necked stilt, and American avocet. The LANWR has the highest number (21 percent) of shorebirds found along the Texas Coast, and is an officially-designated Western Hemisphere Shorebird Reserve Network site. Moreover, the area is important wintering habitat for shorebirds and waterfowl; 80 percent of the continental red-headed duck population winters on the Laguna Madre. Cordgrass habitat along the Laguna Madre provides crucial habitat for mottled ducks, which have been declining in Texas for several decades.

3.7.1.3 Endangered Species Act of 1973

The Endangered Species Act, as amended (16 USC 1531-1544), prohibits the taking of a listed species. The definition of "take" includes to harass, harm, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. "Harm" includes significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). The Act "ensures that any actions authorized, funded, or carried out by federal agencies do not jeopardize the continued existence of any listed endangered or threatened species or adversely modify or destroy critical habitat of such species. An "endangered" species is defined as one that is in danger of extinction throughout all or a significant portion of its range. A "threatened" species is defined as one that is likely to become endangered in the foreseeable future.

The purpose of the Endangered Species Act is to conserve threatened and endangered species and the ecosystems that they depend on and to establish a process for adding qualified species (and habitat critical to their continued existence) to the official list through a formal rulemaking procedure that includes public input and involvement. The Endangered Species Act applies to any project that may impact threatened or endangered species and/or their associated critical habitat. Any time an action may affect a listed species or its critical habitat, the agency, organization or individual taking the action shall consult with the USFWS. Failure to comply with the Endangered Species Act can result in civil and criminal penalties.

The Secretary of the Interior, through the Endangered Species Program of the USFWS, determines whether to add a species to the federal list of endangered or threatened wildlife and plants depending on threats to habitat, commercial overutilization, disease, the inadequacy of existing regulatory protections, or other natural or manmade factors that could affect the continued existence of a species. This decision is based on the best science available at the time. Once a species is listed, the Endangered Species Act prohibits the following actions unless permitted:

- Import, export, interstate transport or sale of protected animals and plants without a permit;
- Killing, harming, harassing, possessing, or removing protected animals from the wild without a permit or without consulting with USFWS; and
- Removing listed plants from federal lands without a permit.

Section 7 of the Endangered Species Act requires federal agencies to ensure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of designated critical habitat. This section of the Endangered Species Act details the consultation process by which the lead federal agency coordinates with the USFWS. This consultation process is further implemented by regulation (50 CFR 402).

3.7.1.4 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) is the federal regulation that governs U.S. marine fisheries management. In 1996, Congress amended the Magnuson-Stevens Act and mandated the identification of essential fish habitat for managed species, as well as measures to conserve and enhance the habitat necessary for fish to carry out their life cycles. Essential fish habitat is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (16 U.S.C. 1802(10)).

The amendment to the Magnuson-Stevens Act required all Fishery Management Councils to establish regulatory guidelines to assist the Councils in the description and identification of essential fish habitat in fishery management planning. The Gulf of Mexico Fisheries Management Council prepares Fishery Management Plans to manage commercial fishery resources found in the Gulf of Mexico from where state waters end out to the 200-mile federal territorial limit of the Gulf of Mexico. The following Fishery Management Plans have been prepared for the Gulf of Mexico: shrimp, red drum, reef fish, stone crab, spiny lobster, coral and coral reef, and Coastal Migratory Pelagic Fisheries. Amendments to these Fishery Management Plans divided essential fish habitat into two classifications: estuarine areas and marine areas. Estuarine areas identified as essential fish habitat include estuarine emergent wetlands; mangrove wetlands; submerged aquatic vegetation; algal flats; mud, sand, shell and rock substrates; and the estuarine water column. The marine essential fish habitat boundary is seaward of the coastal barrier islands and includes all waters and substrates within the U.S. Exclusive Economic Zone[1] seaward of the estuarine essential fish habitat boundary. Specifically, marine areas identified as essential fish habitat include the water column, vegetated bottoms, non-vegetated bottoms, live bottoms, coral reefs, artificial reefs, geologic features, continental shelf features, the West Florida shelf, the Mississippi/Alabama shelf, the Louisiana/Texas shelf and the South Texas shelf.

[1] The area under national jurisdiction (up to 200 nautical miles [370 kilometers] wide) declared in line with the provisions of the 1982 United Nations Convention of the Law of the Sea, within which the coastal nation has the right to explore and exploit, and the responsibility to conserve and manage the living and non-living resources.

In addition to managing for particular species, NOAA Fisheries recommended that the Fishery Management Plans identify Habitat Areas of Particular Concern. The general types of Habitat Areas of Particular Concern are identified for all managed species as follows:

- Nearshore areas of intertidal and estuarine habitats with emergent and submerged vegetation;
- sand and mud flats, shell and oyster reefs;
- other substrates that may provide food and rearing for juvenile fish and shellfish managed by the Gulf of Mexico Fisheries Management Council;
- migration route areas for adult and juvenile fish and shellfish;
- habitats that are sensitive to natural or human-induced environmental degradation, especially in urban areas and in other areas adjacent to intensive human-induced developmental activities; and
- offshore areas with substrates of high habitat value and diversity or vertical relief, which serve as cover for fish and shellfish.

3.7.1.5 Coastal Barrier Resources Act

Congress passed the Coastal Barrier Resources Act on October 18, 1982, to minimize the loss of human life, the wasteful expenditure of federal revenues and damage to the natural and other resources of coastal barrier systems along the Atlantic and Gulf Coasts. The statute placed restrictions on the expenditure of federal funds for developmental activities. Specifically, Section 5 of the Coastal Barrier Resources Act prohibits new expenditures for highway projects occurring within the boundaries of a designated unit or for bridges and causeways leading directly to and extending into such units. Projects identified as exclusions to the Coastal Barrier Resources Act must be coordinated through and approved by the USFWS.

Within the study area there are lands that are designated as part of the Coastal Barrier Resources Act. In general, the Coastal Barrier Resources Act lands are located on South Padre Island north of the study area, but include Andy Bowie Park. **Exhibit 3-13** identifies Coastal Barrier Resources System lands within the study area.

3.7.1.6 Texas Coastal Management Program

The Texas Coastal Management Program is a “networked” program linking the regulations, programs and expertise of state, federal and local entities that manage various aspects of coastal resource use. Specifically, the Texas Coastal Management Program identifies coastal natural resource areas; identifies uses or activities that may adversely affect those areas; and sets uniform policies to address those effects. Management of the Texas Coastal Management Program is overseen by the Texas General Land Office on behalf of the Coastal Coordination Council. The Council is charged with adopting uniform goals and policies to guide decision-making by all entities regulating or managing natural resource use within the Texas coastal zone, and reviewing significant actions taken or authorized by state agencies and subdivisions that may adversely affect coastal natural resources. Policy Category 8 of the Texas Coastal Management Program (Texas Administrative Code Title 31, Part 16, Chapter 504), Development in Critical Areas, states that there shall be no net loss of critical area functions and values.

The entire study area lies within the Texas Coastal Management Program boundaries. Areas that fall under the jurisdiction of the Texas Coastal Management Program include the following:

- Waters of the open Gulf of Mexico,
- Waters under tidal influence,
- Submerged lands,
- Coastal wetlands,
- Submerged aquatic vegetation,
- Tidal sand and mud flats,
- Oyster reefs,
- Hard substrate reefs,
- Coastal barriers,
- Gulf beaches,
- Critical dune areas,
- Special hazard areas,
- Critical erosion areas,
- Coastal historic areas and
- Coastal preserves.

3.7.1.7 Section 404 of the Clean Water Act

Section 404 of the Clean Water Act requires authorization by the Secretary of the Army, acting through the USACE, for the discharge of dredged or fill material into all waters of the U.S., including wetlands. Prior to granting a permit, the USACE weighs the need to protect aquatic resources against the benefits of the proposed development. USACE policy requires applicants to avoid impacts to wetlands and other waters to the extent practicable, then minimize the remaining impacts and finally take measures to compensate for unavoidable impacts (USACE 2003).

3.7.1.8 Section 10 of the Rivers and Harbors Act of 1899

The USACE also issues permits under Section 10 of the Rivers and Harbors Act of 1899 (also 33 USC 403) for filling, dredging and construction in certain waters of the U.S. Section 10 of the Rivers and Harbors Act of 1899 empowers the USACE to regulate all work on structures in or affecting the course, condition or capacity of a navigable water of the U.S.

3.7.1.9 Section 9 of the Rivers and Harbors Act

The General Bridge Act of 1946 (formerly Section 9 of the Rivers and Harbors Act of 1899) empowers the U.S. Coast Guard to regulate the construction of bridges and causeways within or across navigable waterways.

3.7.1.10 State-owned Submerged Lands

The Texas General Land Office has jurisdiction over the state-owned submerged lands, which is the area from mean high tide along the gulf beach or bay-estuary shoreline to 10.36 miles offshore in the gulf. The Texas General Land Office is committed to the protection of wetlands, seagrasses and dunes, works closely with the TPWD, and is the lead agency for the Texas Coastal Management Program.

3.7.1.11 Dune Protection Act

The Texas General Land Office has authority under Chapter 63 of the Texas Natural Resources Code, also referred to as the Dune Protection Act. Specifically, Section 63.121 gives the Texas General Land Office the authority to establish critical dune areas, which it has identified as all

dunes and dune complexes located within 1,000 feet of mean high tide of the Gulf of Mexico, and Section 63.013 gives the Texas General Land Office review authority over Dune Protection Lines established by local governments. Activities that damage, destroy, or remove a sand dune or a portion of a sand dune seaward of a dune protection line or within a critical dune area and those that kill, destroy, or remove in any manner any vegetation growing on a sand dune seaward of a dune protection line or within a critical dune area are prohibited without a Dune Protection Permit.

3.7.1.12 Texas Parks and Wildlife Department

The TPWD has regulatory jurisdiction over the Texas Parks and Wildlife Code. Chapter 14 of the Texas Parks and Wildlife Code describes the powers and duties of the TPWD with regards to wetlands. Specifically, Section 14.002 states that the TPWD, in conjunction with the Texas General Land Office, shall develop and adopt a wetlands conservation plan for state-owned wetlands. The *Texas Wetlands Conservation Plan* (TPWD 1997i) was finalized in the spring of 1997.

3.7.1.13 Seagrass Conservation Plan

The TPWD, Texas General Land Office and TCEQ have also taken the lead in targeting for immediate action certain critical issues to protect the health and quality of Texas seagrass beds, and in 1998 the TPWD prepared the *Seagrass Conservation Plan for Texas* (TPWD 1999e).

The *Seagrass Conservation Plan for Texas* addresses the main research and management issues with regards to seagrasses, programs to solve problems, relationship of programs to the *Texas Wetland Conservation Plan,* and stakeholders and agency contributions to the plan. The short-term, key strategies of the plan with regards to management of seagrasses include the protection of water and sediment quality in seagrass beds; protection of seagrass beds through effective application of the permitting process; and supporting research, monitoring and data synthesis programs that provide sound technical basis for seagrass policies and regulations. Additionally, the Texas General Land Office is dedicated to the following: (1) implementation of formal action to establish additional Coastal Preserve areas to protect seagrass ecosystems from development impacts, and (2) coordination of procedures to strengthen and integrate the permit review process, which requires standardization of guidelines between permitting and permit-review agencies for seagrass projects requiring compensatory mitigation or restoration.

3.7.1.14 Texas Open Beach Act

The Texas Open Beaches Act is a state of Texas law, passed in 1959 and amended in 1991, which guarantees free public access to beaches on the Gulf of Mexico.

3.7.2 Vegetation Within Study Area

3.7.2.1 Ecoregion

Texas has 10 distinct vegetation areas or ecoregions. The study area lies within the Gulf Prairies and Marshes ecoregion, which occupies approximately 9.5 million acres along the coast of Texas. The Gulf Prairies and Marshes ecoregion is a nearly level, slowly drained plain less than 150 feet in elevation, dissected by streams and rivers flowing into the Gulf of Mexico, and includes the barrier islands lining the coast, which protect the shoreline from wave action, as well as the highly productive estuaries and marshes that support a thriving fishing economy. Existing vegetation types within the study area are consistent with the following descriptions of the Gulf Prairies and Marshes ecoregion.

The Gulf Prairies and Marshes ecoregion is divided into two distinct vegetation units: (1) gulf prairies and (2) gulf marshes. The gulf prairies unit includes the nearly flat plain extending from the mainland gulf marsh unit 30 to 80 miles inland. Gulf prairies are nearly level, virtually un-dissected and have slow surface drainage. Elevation of this unit ranges from sea level to 150 feet above mean sea level. Soils of the gulf prairies are dark, neutral to slightly acid clay loams and clays in the northeastern parts, with less acidic soils further south in the coastal bend. A narrow band of light acid sands and darker loamy to clayey soils stretches along the coast, and inland there is a narrow belt of lighter acid fine sandy loam soils with gray to brown and red mottled subsoils. Soils of the river bottomlands and broad deltaic plains are reddish brown to dark gray, slightly acid to calcareous, loamy to clayey alluvial. Historically, tallgrass prairies and post oak savannas were the dominant vegetation types of the gulf prairies; however, trees and shrubs such as honey mesquite *(Prosopis glandulosa)*, oak *(Quercus* spp.*)* and acacia *(Acacia* spp.*)* have increased and formed a thicket in many places. Characteristic tree and shrub species of the gulf prairies include live oak *(Quercus virginiana)*, post oak (*Quercus stellata)*, sweet acacia *(Acacia smallii)*, blackbrush *(Acacia rigidula)* and bushy seaside tansy *(Borrichia frutescens).* Principal climax grasses of the Gulf Prairie are Gulf cordgrass *(Spartina spartinae),* big bluestem *(Andropogon gerardii)*, little bluestem *(Schizachyrium scoparium)*, indiangrass *(Sorghastrum nutans)*, eastern gamagrass *(Tripsacum dactyloides),* hairawn muhly *(Muhlenbergia capillaris),* tanglehead *(Heteropogon contortus)*, as well as other grass species (*Panicum* spp. and *Paspalum* spp.). Yankeeweed *(Eupatorium compositifolium)*, broomsedge bluestem *(Andropogon virginicus)*, smutgrass *(Sporobolus indicus)*, western ragweed *(Ambrosia psilostachya)*, tumblegrass *(Schedonnardus paniculatus),* threeawn *(Aristida* spp.*)* and many annual forbs and grasses are common invasive species. Additionally, pricklypear *(Opuntia* spp.*)* are common throughout the area, as are aster *(Aster* spp.*),* Indian paintbrush *(Castilleja indivisa)*, poppy mallow *(Callirhoe* spp.*)*, phlox *(Phlox* spp.*),* bluebonnet *(Lupinus* spp.*)* and evening primrose *(Oenothera* spp.*)*.

The gulf marshes unit includes a narrow strip of lowlands adjacent to the coast and the barrier islands. This vegetation unit is a low, wet, marshy coastal area that is commonly covered with salt water, and ranges from sea level to a few feet in elevation. Soils of the gulf marshes are dark, poorly drained sandy loams and clays and light neutral sands, typically showing little textural change with depth. The Gulf Marsh areas, having varying levels of salinity, support species of sedge *(Carex* spp. and *Cyperus* spp.*)*, rush *(Juncus* spp.*)*, bulrush *(Scirpus* spp.*)*, cordgrass *(Spartina* spp.*),* seashore saltgrass *(Distichlis spicata)*, common reed *(Phragmites australis),* giant cutgrass *(Zizaniopsis miliacea)*, longtom *(Paspalum lividum)*, seashore dropseed *(Sporobolus virginicus)* and marsh bristlegrass *(Setaria geniculata).* Giant cutgrass and maidencane *(Panicum hemitomon)* are two of the most important grasses of the freshwater marshes of the upper coast. Common aquatic forbs are pepperweed *(Lepidium* spp.*)*, smartweed *(Polygonum* spp.*),* dock *(Rumex* spp.*),* seedbox *(Ludwigia alternifolia)*, green parrot's-feather *(Myriophyllum pinnatum),* pennywort *(Hydrocotyle* spp.*)*, water lily *(Nymphaea* spp.*),* narrowleaf cattail *(Typha angustifolia)*, spiderwort *(Tradescantia* spp.*)* and duckweed *(Lemna* spp.*).* Common halophytic herbs and shrubs on salty sands are spikesedge *(Eleocharis* spp.*)*, fimbry *(Fimbristylis* spp.*)*, glasswort *(Salicornia* spp.*)*, sea-rocket *(Cakile* spp.*),* turtleweed *(Batis maritima),* morning glory *(Ipomoea* spp.*)* and bushy seaside tansy. The low marshy areas provide excellent natural wildlife habitat for upland game and waterfowl, and the higher elevations of the gulf marshes are used for livestock and wildlife production.

The native vegetation type covering much of southern Texas is mesquite-grassland, an important element of the ecoregion that plant ecologists classify as characteristic of the Tamaulipan biotic province. The Tamaulipan province extends south of the border for almost 200 miles between the coast and the deciduous woodlands on the slopes of the Sierra Madre

Oriental. The Tamaulipan thorn-scrub, a subtropical, semi-arid vegetation type, occurs on either side of the Rio Grande. Spiny shrubs and trees dominate this thorn-scrub, but grasses, forbs and succulents are also prominent (Crosswhite 1980). The slightly higher, drier and rockier sites originally had vegetation of chaparral and cacti, whereas the flat, deep soils supported mesquite as well as taller brush and a few drought-resistant trees, often rather openly spaced and savanna-like in a grassland matrix. This region also includes elements of pastizal, a combination of grassland, savanna and páramo-like communities. Leguminous shrubs and trees constitute one-third of the diverse woody flora, which the rural population uses for extensive grazing of livestock, fuel wood and timber for fencing and construction (Reid, et al. 1990).

3.7.2.2 Vegetation Types of Texas

The study area includes six mapped vegetation communities, as defined in TPWD's *The Vegetation Types of Texas, Including Cropland* (McMahan et al. 1984): Mesquite-Blackbrush Brush, Marsh/Barrier Islands, Crops, Other Native and/or Induced Grasses, Urban, and Lakes. Refer to **Exhibit 3-14** for the mapped vegetation communities within the study area. Existing vegetation types are consistent with the Vegetation Types of Texas classification descriptions (McMahan et al. 1984).

3.7.2.3 Observed Vegetation Communities

A habitat field reconnaissance survey was performed to field verify the mapped vegetation types. The field survey identified nine vegetation communities – each of which can be generally categorized under the mapped vegetation types of Texas. These communities include light brush/dense brush, rangeland, farmland, riparian, fence line, dune, seagrasses, and landscape. These vegetation communities are discussed below.

Light Brush and Dense Brush

Dominant species found in the thorn-scrub habitat include honey mesquite, spiny hackberry, lotebush (*Ziziphus obtusifolia*), Brazilian bluewood (*Condalia hookeri*), lime pricklyash (*Zanthoxylum fagara*), sweet acacia (*Acacia smallii*), blackbrush (*Acacia rigidula*) and Texas ebony (*Ebenopsis ebano*). The thorn-scrub brush community provides crucial habitat for the endangered ocelot (*Felis paradalis*) and other threatened and endangered species and has been separated into light brush and dense brush. Dense brush has approximately 75 percent cover and light brush has approximately 25-75 percent cover. Based on review of aerial photography, approximately 2,000 acres of light brush and dense brush habitat is located within the study area.

Rangeland

A large portion of rangeland on the mainland has been converted to urban or agricultural use. On the barrier islands, rangeland covers the central part of the islands. The most common grass in this area is seacoast bluestem *(Schizachyrium scoparium* var. *littorale).* Other grass species found in the rangeland habitats include smooth cordgrass (*Spartina alterniflora*), gulf cordgrass (*Spartina spartinae*) and seashore dropseed (*Sporobolus virginicus*). Wildflowers and cacti also inhabit rangeland on the barrier islands and the mainland (Cannatella and Arnold 1985). In most of the project area, the rangeland is dominated by dwarf saltwort (*Salicornia bigelovii*), Virginia glasswort (*Salicornia virginica*), and turtleweed (*Batis maritima*). Other forbs found within the rangeland habitats include bushy seaside tansy (*Borrichia frutescens*), camphor daisy (*Machaeranthera phyllocephala*) and seepweed (*Suaeda* spp.). The average height of species within the rangeland ranges from 6-12 inches. Based on review of aerial photography, approximately 30 acres of rangeland habitat is located within the study area.

Rangeland is an important habitat for grassland birds and mammal species. Rare, threatened and endangered species that may inhabit rangelands within the study area include the following: Texas Botteri's Sparrow (*Aimophila botterii texana*), White-tailed Hawk (*Buteo albicaudatus*), Northern Aplomado Falcon (*Falco femoralis septentrionalis*), American Peregrine Falcon (*Falco peregrinus anatum*), Arctic Peregrine Falcon (*Falco peregrinus tundrius*), Audubon's Oriole (*Icterus graduacauda audubonii*), jaguarundi (*Herpailurus yaguarondi*), ocelot (*Leopardus pardalis*), plains spotted skunk (*Spilogale putorius interrupta*) and Texas tortoise (*Gopherus berlandieri*).

Farmland

Farmland habitat within the study area is predominantly citrus orchards near the Bayview area. Other farmlands are located in the northern portions of the study area and consist of row crops of sorghum, corn, sugarcane, and cotton. Based on aerial photography review, approximately 375 acres of farmland habitat is located within the study area.

Riparian

Riparian habitats include vegetation found along the banks and on the floodplains of rivers, creeks and streams. Riparian habitats within the project area occur along the banks of resacas. Riparian forests improve water quality and quantity and provide important nutrients to the streams and rivers. Riparian vegetation also holds water by slowing the rate at which water moves from the land into streams and shaded waterways lose much less water to evaporation. Similar to thorn-scrub brush vegetation, riparian corridors provide crucial habitat for the endangered ocelot, other threatened and endangered species and migratory birds. Based on aerial photography review, approximately 490 acres of riparian habitat is located within the study area.

Fence Line

Honey mesquite (*Prosopis glandulosa*) and spiny hackberry (*Celtis pallida*) comprise the majority of the fence line vegetation with diameter at breast height ranging from two to six inches with an average diameter at breast height of four inches. The height of the trees along the fence line ranges from 10 to 15 feet. Based on aerial photography review, approximately 40 acres of fence line habitat is located within the study area.

Dune

South Padre Island contains substantial dune habitats which are regulated under the Dune Protection Act, as discussed in **Section 3.7.1.11**, above. The dune habitat provides habitat for many wildlife species including the rare keeled earless lizard. The dune habitat also supports a rare vegetation community (Seacoast Bluestem-Gulfdune Paspalum Series) described in **Section 3.7.2.4**.

Of the nearly 400 miles of coastline in Texas, approximately 320 miles are fronted by the barrier island chain, which is composed of long, narrow, gradually sloping islands. The coastal shore within the study area is completely contained on the South Padre Island, and there are approximately 116 acres of beach habitat within the study area, as designated by the National Wetlands Inventory (USFWS 2009m). Barrier islands serve as buffer zones and help protect the mainland from frequent tropical storms and hurricanes. The barrier island system is dynamic as the active shore currents continuously deposit and remove sand. Because of this constant state of flux, barrier islands are fragile areas and any abrupt change can strongly affect them (Cannetella and Arnold 1985).

Sand dunes form a ridge along the front of the barrier islands. Eolian processes form these dunes, and if a dune is not protected by vegetation, these same processes can erode the dune. The dune system is a stressful environment, and many plants are unable to tolerate the frequent winds, shifting sand, the salt spray from gulf waters, or the extreme dryness of the sandy substrate. Common plants that grow on the dunes include sea oats *(Uniola paniculata),* bitter panicgrass *(Panicum amarum),* Gulf croton *(Croton punctatus)*, beach morning glory *(Ipomea stolonifera)* and bayhop *(Ipomoea pes-caprae)* (Cannatella and Arnold 1985).

The barrier island beaches and dunes are predominantly located on the gulf side of the island. Park Road 100 bisects the dune system north of the City of South Padre Island. Beaches and dunes on the gulf side of the island and a portion of the dune system on the west side of Park Road 100 are protected by the Open Beaches Act (Chapter 61 of the Texas Natural Resources Code) and the Dune Protection Act (Sections 63.001 to 63.181 of the Texas Natural Resources Code). Impacts to dunes protected under these Acts require a permit issued by Cameron County.

Human activities such as construction, recreation and grazing animals may accelerate or aggravate natural damage to the dune system by destroying vegetative cover and promoting development of beaches. Disturbance of dunes by vehicles, pedestrians, construction and grazing animals can promote wind erosion that can lead to the complete removal of a dune, which depletes the supply of sand available for exchange during storms and disrupts the dune process.

Seagrass

Seagrass meadows are a dominant, unique subtropical habitat in many Texas bays and estuaries. Seagrasses within the Laguna Madre are managed by the Texas General Land Office and TPWD. The seagrasses provide habitat for threatened and endangered sea turtles and provide nursery habitat for many commercially and recreationally valuable aquatic species. As mentioned in **Section 3.7.1.10**, above, Texas General Land Office policies consist of measures to protect this vital habitat.

Globally, seagrasses have been declining at a rate of 110 square kilometers per year since 1980 and the decline is accelerating at a rate of 7 percent per year (Waycott, et al. 2009). In Texas, approximately 235,000 acres of seagrasses is remaining as of 1994 (TPWD 1999e). Seagrasses grow in permanently inundated areas ranging from highly saline to brackish waters, and they thrive in shallow subtidal areas of less than 6 feet in depth. Most seagrass meadows in Texas are found within the Laguna Madre. These meadows play critical roles in the coastal environment by providing nursery habitat for estuarine fishes, organic biomass for coastal food webs, effective natural agents for stabilizing coastal erosion and sedimentation, and major biological agents in nutrient cycling and water quality processes (Withers 2002). There are five seagrass genera that occur in Texas: *Halodule, Syringodium, Halophila, Thalassia* and *Ruppia.* These are actually highly specialized marine flowering plants, and are not grasses, that grow rooted and submerged in the higher salinity waters of some Texas bays and estuaries. Although technically not a seagrass, widgeongrass (*Ruppia maritima*) grows in low salinity and freshwater habitats. Widgeongrass often intermixes with shoalgrass *(Halodule wrightii*) in higher salinity areas of all Texas bays. Shoalgrass is the most abundant seagrass on the Texas coast, and the most extensive beds occur in the upper Laguna Madre. Clovergrass (*Halophila engelmanni*) occur in small populations and comprise the understory habitat in the extensive shoalgrass beds in the upper Laguna Madre. Turtlegrass *(Thalassia testudinum)* and manateegrass *(Syringodium filiforme)* are most abundant in the lower Laguna Madre and Corpus Christi Bay area. Additionally, the lower Laguna Madre, which encompasses the entire

study area, contains approximately 50.5 percent of the seagrass beds on the Texas coast, and there are approximately 106,500 acres of seagrass beds within the study area (TPWD 1999e). Turtlegrass and manateegrass are the two main seagrass species that occur within the project area. Shoalgrass is a minor component in the lower Laguna Madre.

Seagrass meadows play a critical role in the coastal environment by providing nursery habitat for estuarine fishes, organic biomass for coastal food webs, effective natural agents for stabilizing coastal erosion and sedimentation, and major biological agents in nutrient cycling and water quality processes (Withers 2002). Preventing the loss of this habitat is of utmost importance to federal and state agencies, including the USFWS, NOAA Fisheries and TPWD. Seagrass meadows in the Laguna Madre are still abundant but threatened, so the focus in this area is on protecting existing seagrass meadows.

Impacts that may result in the loss of seagrass include direct alterations to a vegetated area and indirect actions within a watershed. Seagrass is particularly susceptible to poor water quality and physical disturbance. Texas seagrass meadows are mostly threatened by dredging and dredge disposal, subsidence and high nutrient loading from non-point source pollution. Additionally, reduction of light penetration and overall availability of light causes a decrease in seagrass productivity. Reduction of light may be caused by increased turbidity or shading from structures. With a reduction in light over time, the depth of seagrass habitats may be reduced and the natural seagrass communities may diminish and/or their functions as habitat and shelter may be decreased or lost entirely (Zieman and Zieman 1989). Since seagrass requirements are more stringent than those of other coastal marine resources, controlling the type, intensity, extent and duration of impacts that may damage seagrass will further other efforts to restore and protect this sensitive vegetation.

Seagrass surveys were conducted on July 20 and 21, 2009 to identify species diversity and cover within the study area (**Appendix H**). Turtlegrass is the primary seagrass species identified within the study area. The survey results indicated that turtlegrass comprises between 39.4 to 97.0 percent of the seagrass along each alternative. Sparse populations of manateegrass were found in the deeper waters at the edges of the seagrass beds. When present, manateegrass comprised approximately 9 percent of the seagrass and comprises 2.4 percent of the entire study area. Several species of algae made up the remainder of the submerged aquatic vegetation comprising 9.5 percent of the community. There were no significant differences in seagrass community diversity, frequency of species, or percent cover for turtlegrass between the alternatives.

Landscape

Landscaped vegetation is located in residential and urban areas and consists of lawns and flower beds with annual and perennial vegetation that is watered. Based on aerial photography review, approximately 12 acres of landscape vegetation is located within the study area.

3.7.2.4 Rare Vegetation Communities

In accordance with Provision (4)(A)(ii) of the TxDOT/TPWD Memorandum Of Understanding (TxDOT 1998), the TxDOT/TPWD Memorandum Of Agreement (TxDOT and TPWD 2001) identifies non-regulatory habitats that TxDOT would consider mitigating should the project impact the habitats. These habitats include any habitat for federal candidate species if mitigation would prevent the listing of the species; S3 vegetation series that provide habitat for state listed species; S1 and S2 vegetation series; native prairies and riparian sites; and any other habitat feature considered to be locally important. S1 communities are critically imperiled

in the state, extremely rare and very vulnerable to extirpation. S2 communities are imperiled in the state, very rare and vulnerable to extirpation. S3 communities are rare or uncommon in the state. Three S1-S3 vegetation communities occur within the proposed study area.

Black Mangrove Series

The Black Mangrove (*Avicennia germinans*) community is ranked as an S2 community by TPWD (TPWD 1993d). Black mangroves occur along the Laguna Madre shoreline of South Padre Island. Within the study area, sparse populations also occur along the mainland shoreline. The Black Mangrove community is intermixed with smooth cordgrass (*Spartina alterniflora*), dwarf saltwort (*Salicornia bigelovii*), Virginia glasswort (*Salicornia virginica*), turtleweed (*Batis maritima*) and seepweed (*Suaeda* spp.).

Seacoast Bluestem-Gulfdune Paspalum Series

The Seacoast Bluestem (*Schizachyrium scoparium* var. *littorale*)-Gulfdune Paspalum (*Paspalum monostachyum*) community is ranked as an S3 community by TPWD (TPWD 1993d). This vegetation community occupies the stabilized secondary dunes and vegetated flats on South Padre Island. Dropseed (*Sporobolus* spp.), lovegrass (*Eragrostis* spp.) and sedges (*Carex* spp., *Scirpus* spp. *Fuirena* spp. and *Fimbristylis* spp.) are also components of the vegetation community.

Texas Ebony-Anacua Series

The Texas Ebony (*Ebenopsis ebano*)-Anacua (*Ehretia anacua*) series occurs primarily along moist river and resaca terraces in the lower Rio Grande Valley. This vegetation series is ranked as an S1 community by TPWD (TPWD 1993d). In addition to Texas ebony and anacua, the plant species in this vegetation community include saffron plum (*Bumelia celastrina*), haujillo (*Pithecellobium pallens*), great leadtree (*Leucaena pulverulenta*), lime pricklyash (*Zanthoxylum fagara*), Brazilian bluewood (*Condalia hookeri*), spiny hackberry (*Celtis pallida*), lotebush (*Ziziphus obtusifolia*) and mesquite (*Prosopis* sp.).

3.7.3 Wildlife

Cameron County is located in the subtropical Tamaulipan biotic province, which is characterized by a dense growth of shrubs and small trees. The subtropical nature of this biotic province is evident in the wildlife species diversity of the Lower Rio Grande Valley. The range of many tropical wildlife species such as the ocelot, jaguarundi, white-nosed coati (*Nasua narica*), Northern Beardless-tyrannulet (*Camptostoma imberbe*), Rose-throated Becard (*Pachyramphus aglaiae*), Tropical Parula (*Parula pitiayumi*), black-striped snake (*Coniophanes imperialis*) and northern cat-eyed snake (*Leptodeira septentrionalis*), reach their northern extent in South Texas. In addition, the ranges of many temperate species reach their southern extent in the Lower Rio Grande Valley such as migratory birds wintering in South Texas. Many of these species are restricted to the isolated, remnant, thorn-scrub habitats that dot the Lower Rio Grande Valley.

3.7.3.1 Wildlife Within the Study Area

The Texas Natural History Collection of the Texas Memorial Museum at the University of Texas contains specimens of 140 fish species found in Cameron County, 42 of which are known to occur in freshwater, brackish water, or estuarine habitats. Common freshwater fish species in Cameron County that would be expected to occur within the resaca and freshwater habitats within the study area include bluegill (*Lepomis macrochirus*), green sunfish (*Lepomis cyanellus*), longear sunfish (*Lepomis megalotis*), largemouth bass (*Micropterus salmoides*), golden shiner

(*Notemigonus crysoleucas*), Rio Grande cichlid (*Cichlasoma cyanoguttatum*), mosquitofish (*Gambusia affinis*) and sheepshead minnow (*Cyprinodon variegatus*).

The ranges of 78 reptile and amphibian species extend into Cameron County, including the spinytail iguana (*Ctenosaura pectinata*) which occurs only in Cameron County as an exotic, introduced species. The American alligator (*Alligator mississippiensis*), three salamander, 16 toad/frog, 32 snake, nine turtle and 17 lizard species are represented in Cameron County. The Lower Rio Grande Valley is one of the leading birding locations in the world and home to the World Birding Center. The World Birding Center is a network of nine sites located in the Lower Rio Grande Valley set aside to protect native habitat for birds and other wildlife. One of the World Birding Center sites is within the study area, the South Padre Island Birding and Nature Center.

The LANWR, located partially within the study area, documents 369 bird species observed on the refuge, 42 of which are considered accidental sightings (only one or two sightings recorded) (U.S. Geological Survey 2007). Avian species identified within the study area included American Coot (*Fulica americana*), Ash-throated Flycatcher (*Myiarchus cinerascens*), Barn Swallow (*Hirundo rustica*), Black-bellied Whistling Duck (*Dendrocygna autumnalis*), Black-necked Stilt (*Himantopus mexicanus*), Brown-headed Cowbird (*Molothrus ater*), Plain Chachalaca (*Ortalis vetula*), Eastern Meadowlark (*Sturnella magna*), Franklin's Gull (*Larus pipixcan*), Golden-fronted Woodpecker (*Melanerpes aurifrons*), Great-tailed Grackle (*Quiscalus mexicanus*), Green Jay (*Cyanocorax yncas*), House Sparrow (*Passer domesticus*), Inca Dove (*Columbina inca*), Killdeer (*Charadrius vociferus*), Ladder-backed Woodpecker (*Picoides scalaris*), Laughing Gull (*Larus atricilla*), Northern Mockingbird (*Mimus polyglottos*), Mourning Dove (*Zenaida macroura*), Muscovy Duck (*Cairina moschata*), Olive Sparrow (*Arremonops rufivirgatus*), Rock Pigeon (*Columba livia*), Scissor-tailed Flycatcher (*Tyrannus forficatus*), Western Kingbird (*Tyrannus verticalis*), Great Egret (*Ardea alba*) and White-winged Dove (*Zenaida asiatica*).

Of the 141 mammal species occurring in Texas, the ranges of 59 mammal species include Cameron County (Davis and Schmidly 1994). Mammal species that potentially occur within the study area include the nine-banded armadillo (*Dasypus novemcinctus*), desert cottontail (*Sylvilagus audubonii*), striped skunk (*Mephitis mephitis*) and coyote (*Canis latrans*). Rodent species occurring in the study area include the hispid pocket mouse (*Chaetodipus hispidus*), deer mouse (*Peromyscus maniculatus*), hispid cotton rat (*Sigmodon hispidus*), fulvous harvest mouse (*Reithrodontomys fulvescens*) and the roof rat (*Rattus rattus*). The Virginia opossum (*Didelphis virginiana*) was the only mammal species observed during field surveys.

The following discussions are not intended to provide a definitive list of species potentially occurring within study area counties but are intended to provide a general overview. It is important to note that not all species occurring or potentially occurring within Cameron County would be expected to occur or potentially occur within the study area. The distribution of species is based in part on the location of suitable habitats and such habitats may not be uniformly distributed or available throughout the county.

Wildlife expected to be typically distributed throughout the study area include various mammals, reptiles, birds and amphibians adapted to continually fragmented and urbanizing habitats. However, the USFWS established the Lower Rio Grande Valley National Wildlife Refuge in Cameron, Hidalgo, Willacy and Starr Counties in an effort to restore and complement existing wildlife corridors. Currently over 100 tracts of scrubland consisting of over 90,000 acres have

been incorporated into the Lower Rio Grande Valley National Wildlife Refuge with a goal of ultimately acquiring 132,500 acres for the refuge.

Wildlife is very diverse and abundant on the Texas Gulf Coast. The study area is located in a biological transition zone of coastal prairies, salt flats and low vegetated ridges supporting thick brushlands composed of mostly mesquite, ebony, cacti and yucca. This transition zone provides many different habitat types and lends itself to increased species diversity. Additionally, the Central and Mississippi Flyways funnel through the study area, and many bird species reach their northernmost range here or use the area as wintering or stopover habitat during migration.

3.7.3.2 Sanctuaries and Preserves

Due to the increased species diversity of the study area and the abundance of special status species, many agencies have taken steps to protect wildlife resources from impacts caused by development. Within the study area, there are wildlife sanctuaries managed by the Audubon Society, coastal preserves established by the Texas General Land Office and TPWD, National Wildlife Refuges managed by the USFWS and colonial waterbird rookery areas identified by the Texas General Land Office, TPWD, USFWS and Texas Colonial Waterbird Society.

Audubon Sanctuaries

The Audubon Society is the primary organization providing continuous monitoring and research on breeding and feeding ecology of wading birds on the Texas coast, and often works with the USFWS. The Texas Audubon Society has established the Texas Coastal Sanctuaries to protect more than 11,000 acres on 33 islands along the Gulf Coast of Texas, including natural and dredge spoil islands. These sanctuaries are located in most of the primary and secondary bays from Galveston Bay to the lower Laguna Madre. The sanctuary islands protect vital nesting and feeding habitat for wading and sea birds, Roseate Spoonbills *(Ajaia ajaia*), Olivaceous Cormorants (*Phalacrocorax olivaceus*), many species of herons and egrets, ibis (*Plegadis* spp.), endangered Brown Pelicans (*Pelecanus occidentalis*), Laughing Gulls, several species of terns (*Sterna* spp.), Black Skimmers (*Rhynchops niger*) and American Oystercatchers (*Haematopus palliates*) (Texas Audubon Society, 1998). One Audubon sanctuary, Three Island, extends approximately 1 mile into the northern portion of the study area.

Coastal Preserves

State coastal preserves are designated by the TPWD and Texas General Land Office. Coastal preserves are lands owned by the state that are designated and used as parks, recreation areas, scientific areas, wildlife management areas, wildlife refuges, or historic sites and that are designated by the TPWD as being coastal in character. The Texas Coastal Preserve Program allows the Texas General Land Office to lease coastal lands to the TPWD, which manages them as preserves. The purpose of this program is to protect unique coastal areas and fragile biological communities, including important colonial bird nesting sites.

There is one coastal preserve located just inside the southern study area boundary: South Bay. South Bay is located in the southernmost extension of the lower Laguna Madre in Cameron County and supports a wide variety of habitat types, including seagrasses, oyster reefs, black mangroves and other salt marsh species, and tidal sand and mud flats. Emergent and submergent vegetation, in addition to extensive algal flats, are an integral part of the organic production and fertility of South Bay. The Lower Laguna Madre supports a diverse fish fauna comprised of 89 fish species and provides nursery habitat for a significant shrimping industry in

the region (Withers and Dilworth, 2002). Additionally, the bay provides excellent feeding, resting and wintering habitat for numerous types of migratory bird species, such as the White Pelican (*Pelecanus erythrorhynchos*), Brown Pelican, cormorants (*Phalacrocorax* spp.), Gadwall (*Anas strepera*), Green-winged teal (*Anas crecca*) and Redhead (*Aytha americana*) (Smith 2002).

3.7.3.3 National Wildlife Refuges

National Wildlife Refuges are managed by the USFWS. There are two National Wildlife Refuges within the study area: LANWR, located immediately north of the project area, and the Lower Rio Grande Valley National Wildlife Refuge, located approximately 60 miles west of the project area.

LANWR is the largest protected area of natural habitat left in the Lower Rio Grande Valley. LANWR is located in a semi-arid and subtropical region, and represents a biological transition zone of coastal prairies, salt flats and low vegetated ridges supporting thick brushlands composed of mostly mesquite, ebony, cacti and yucca. As elevation increases a few feet, changes in soil moisture and salinity favor thorny-brush and savanna. There are two species of endangered cats (ocelot and jaguarundi) that are known to inhabit the refuge, as well as the following both state and federally listed threatened/endangered species: Peregrine Falcon (*Falco peregrinus*), Northern Aplomado Falcon, Brown Pelican and Piping Plover. Species found within the refuge include the following state listed threatened species: Texas tortoise, Green Jay, Plain Chachalaca and collared peccary (*Pecari tajacu*), which prefer the dense thorny brushland areas of the refuge. Alligators, Least Grebes (*Tachybaptus dominicus*) and Black-bellied Whistling Ducks (*Dendrocygna autumnalis*) are located at the ponds and resacas. Greater Roadrunner *(Geococcyx californicanus*), Verdin (*Auriparus flaviceps*) and Cactus Wren (*Campylorhynchus brunneicapillus*) inhabit the scrub areas. Roseate Spoonbills, egrets, herons, Black-necked Stilts, American Avocet (*Recurvirostra americana*) and Piping Plovers inhabit the shore of the Laguna Madre.

The Lower Rio Grande Valley National Wildlife Refuge follows the last 275 river miles of the Rio Grande. Both the Central and Mississippi Flyways funnel through the southern tip of Texas and many species of birds reach their extreme northernmost range here. In addition, subtropic, temperate, coastal and desert influences converge at this juncture creating an ideal situation for species diversity. The Lower Rio Grande Valley National Wildlife Refuge is considered one of the most biologically diverse National Wildlife Refuges in the continental U.S. and represents 11 distinct biotic communities that are host or home to 1,100 types of plants, 700 vertebrate species (including 484 bird species) and over 300 species of butterflies.

Common bird species that can be located within the refuge include Plain Chachalaca, Green Jay, Great Kiskadee (*Pitangus sulphuratus*) and the Least Grebe. Additionally, neotropical migratory birds, shorebirds, raptors and waterfowl can be found at the refuge. Zebra longwings (*Heliconius charitonius*), julias (*Dryas iulia*) and Mexican bluewings (*Myscelia ethusa*) are the most common butterfly species found at the refuge, but there are over 300 species that have been identified with maximum species diversity occurring between October and December. Other common wildlife species within the refuge include the speckled racer (*Drymobius margaritiferus*), southern yellow bat (*Lasiurus ega*), Kemp's ridley sea turtle (*Lepidochelys kempii*), white-tailed deer (*Odocoileus virginianus*) and collared peccary.

3.7.3.4 Colonial Waterbird Rookeries

Most colonial waterbirds rely on estuarine habitats for nesting, feeding and shelter. The deposition of dredged spoil piles related to the construction and maintenance of the Gulf

Intracoastal Waterway has provided artificial nesting habitats for colonial waterbirds that are isolated from disturbance and predators and are located adjacent to shallow and open waters teeming with fish and crustaceans.

The Texas General Land Office, in cooperation with the TPWD, USFWS, the Texas Audubon Society and Texas Colonial Waterbird Society, has identified colonial waterbird rookery areas in the Texas coastal counties and bays. Additionally, the USFWS Texas Coastal Program protects and manages habitat for colonial waterbirds on island rookeries and acts to minimize human disturbance for beach-dependent birds. As part of this effort, data is collected by a variety of volunteers from state, federal and non-profit organizations and professional organizations every year during the Texas Colonial Waterbird Census between late May and early June. The data collected is intended for following long-term trends of colonial waterbird numbers along the Texas coast. Within the study area for this project, three rookery sites have been identified since 1973 and a fourth, Dead Pecker Island, is located approximately 575 feet south of the study area at the intersection of the Port Isabel Channel and the Brownsville Ship Channel. **Table 3-22** provides a summary of species known to utilize the rookeries since 1973.

Table 3-22: Colonial Waterbird Rookeries Within Study Area

Species	Laguna Vista Spoil			Port Isabel Spoil			Three Island Spoil			Dead Pecker Island		
	N[1]	Avg[2]	Max[3]	N	Avg	Max	N	Avg	Max	N	Avg	Max
American Oystercatcher	2	4	4	2	1	1	3	1	1	3	2	3
Black Skimmer	26	299	482	19	199	482	32	247	737	10	79	250
Black-crowned Night Heron	6	10	17	-	-	-	3	11	20	-	-	-
Brown Pelican[4]	2	100	100	-	-	-	-	-	-	-	-	-
Caspian Tern	23	103	230	3	9	16	8	90	150	-	-	-
Cattle Egret	-	-	-	-	-	-	-	-	-	2	4	4
Forster's Tern	3	80	150	2	8	8	12	53	120	-	-	-
Great Blue Heron	10	22	60	-	-	-	15	17	40	3	5	7
Great Egret	5	7	19	2	1	1	9	20	96	2	500	500
Gull-billed Tern	22	131	400	3	258	514	26	147	2053	4	17	30
Laughing Gull	28	2614	12,000	19	358	975	31	4019	10,150	3	7	7
Least Tern[5]	12	26	50	3	3	3	4	5	10	4	7	11
Little Blue Heron	7	8	20	-	-	9	10	24	107	-	-	-
Reddish Egret[6]	27	49	192	17	11	23	26	95	328	2	5	5
Roseate Spoonbill	4	8	18	-	-	-	4	3	5	2	11	11
Royal Tern	26	1,075	4740	16	125	1,020	29	1,779	4,982	5	24	65
Sandwich Tern	18	795	4120	7	76	250	27	1089	3550	2	4	4
Snowy Egret	21	118	420	11	17	82	18	101	465	8	128	400
Sooty Tern[6]	2	2	2	4	1	2	20	6	20	-	-	-
Tricolored Heron	28	188	620	19	46	102	27	349	1323	10	295	1,00
White Ibis	7	39	150	-	-	-	9	14	62	-	-	-
White-faced Ibis[6]	3	4	6	-	-	-	7	25	76	-	-	-
Yellow-crowned Night Heron	-	-	-	-	-	-	3	2	2	-	-	-

Source: USFWS 2000i, Clear Lake Field Office, Texas Colonial Waterbird Census (1973-present)

[1] Number of years between 1973 and 2006 that colonial waterbird nests were observed at site.

[2] Average number of breeding bird pairs for years when nests were identified.

[3] Maximum number of breeding pairs identified at any one time for the species in a year.

[4] Colonial waterbird species that is listed as an endangered species by the USFWS and TPWD and is currently proposed for delisting by the USFWS.

[5] The Coastal Least Tern (*Sterna antillarum antillarum*) is not listed as by the USFWS and TPWD; however, wintering Interior Least Terns (*Sterna antillarum atholassos*) are listed as endangered by the USFWS and TPWD.

[6] Colonial waterbird species that is listed as threatened by TPWD.

The Laguna Vista Spoil colonial waterbird rookery (Colony 618-220) is located east of Laguna Vista Cove, separated from the cove by Loma de la Grulla. Between 1977 and 2006, the Laguna Vista Spoil rookery provided nesting habitat for 21 species of birds. In 2006, the latest data available, at least 14 species of birds were known to nest on the spoil islands including approximately 2,200 Laughing Gulls and 2,000 Royal Terns (*Sterna maxima*). In addition, hundreds of Black Skimmers, Caspian Terns (*Sterna caspia*), Reddish Egrets (*Egretta rufescens*), Sandwich Terns (*Sterna sandvicensis*), Snowy Egrets (*Egretta thula*) and Tricolored Herons (*Egretta tricolor*) commonly nest on the Laguna Vista Spoil Islands.

The Port Isabel Spoil (Colony 618-200) consists of a linear set of spoil islands adjacent to the Gulf Intracoastal Waterway centered in the Laguna Madre within the study area. Since 1973, the Port Isabel Spoils have supported the nesting of at least 14 species of waterbirds, including the state threatened Reddish Egret and Sooty Tern (*Sterna fuscata*). Between 1973 and 1990 the spoils provided nesting habitat for hundreds of Laughing Gulls and Black Skimmers. In

addition to other species listed in **Table 3-22**, a colony of 1,020 royal terns occupied the spoils in 1977. The number of nesting waterbirds has declined since 1990 as the spoil islands have eroded and subsided. The last significant nesting data recorded for the spoils was in 1998, which included 40 Sandwich Tern, 4 Royal Tern, 2 Least Tern, 2 Laughing Gull and an American Oystercatcher nest. The last nests recorded for this site was in 2002 when three royal tern nests were identified.

The Three Island Spoil colonial waterbird rookery (Colony 618-182) is a series of dredged spoils following the Gulf Intracoastal Waterway north of the Port Isabel Spoils rookery described above. Three Island Spoil is approximately 6 miles in length with only the southern mile of the spoil islands located within the northern portion of the study area. The Three Island Spoil rookeries provide the highest diversity of colonial waterbird species within the study area with at least 21 species utilizing the islands between 1973 and 2005. The USFWS colonial waterbird census data report nesting data for Three Islands every year since 1973, with the exception of 1997, 2004 and 2006. Three Island Spoil provides habitat for thousands of nesting Laughing Gulls, Royal Terns and Sandwich Terns and hundreds of Black Skimmers, Caspian Terns and Tricolored Herons.

Although located just south of the study area, colonial waterbirds nesting at Dead Pecker Island could utilize portions of the study area as foraging habitat. As stated above, Dead Pecker Island is located at the intersection of the Port Isabel Shipping Channel and the Brownsville Shipping Channel. Dead Pecker Island has provided nesting habitat for at least 14 species of colonial bird species since 1973, including approximately 1,200 Tricolored Heron nests in 1979. Although the last significant colonial waterbird nesting recorded on the island occurred in 2002, the island has supported relatively large nesting populations of Snowy Egrets, Royal Terns, Great Egrets and Black Skimmers.

3.7.3.5 Essential Fish Habitat

Essential fish habitats are designated by the NOAA Fisheries and Gulf of Mexico Fisheries Management Council. As discussed in **Section 3.7.1.4**, the Gulf of Mexico Fisheries Management Council has prepared the following Fishery Management Plans: shrimp, red drum, reef fish, stone crab, spiny lobster, coral and coral reef, and Coastal Migratory Pelagic Fisheries. **Table 3-23** identifies the management area for each Fishery Management Plan.

Table 3-23: Fishery Management Areas

Fishery Management Plan	Management Area	Within Study Area
Shrimp	All estuaries and waters from estuarine waters to the Gulf of Mexico Fishery Management Council boundary[1] between the depths of 30 and 60 feet.	Yes
Red Drum	All estuaries and waters from estuarine waters to the Gulf of Mexico Fishery Management Council boundary between the depths of 30 and 60 feet.	Yes
Reef Fish	All estuaries and waters from estuarine waters to the Gulf of Mexico Fishery Management Council boundary to depths of 600 feet.	Yes
Stone Crab	All estuaries and waters from estuarine waters to the Gulf of Mexico Fishery Management Council boundary to depths of 60 feet.	Yes
Spiny Lobster	Offshore areas from North Carolina to Texas	No
Corals and Coral Reefs	Oceanic habitats from nearshore environments to continental slopes and canyons	No
Coastal Migratory Pelagic Fisheries	All estuaries and waters from estuarine waters to the Gulf of Mexico Fishery Management Council boundary to depths of 600 feet.	Yes

[1] Fishery Conservation Zone: extends from the seaward boundary of the United States territorial sea (3 nautical miles for the Gulf of Mexico States of Louisiana, Mississippi and Alabama, and 9 nautical miles for Texas and the west coast of Florida) to a point 200 miles from shore.
Source: Gulf of Mexico Fishery Management Council, 2005.

As identified in **Table 3-23**, the study area is within the management areas of the shrimp, red drum, reef fish, stone crab, and coastal migratory pelagic Fishery Management Plans. The species managed in these Fishery Management Plans are identified in **Table 3-24**. These species utilize the habitats in the Laguna Madre as a spawning area, as nursery habitats, or for food and shelter. Although some species do not inhabit the Laguna Madre to any significant extent, these species depend on prey species that are dependent on the estuarine systems within the study area. Therefore, these species are also considered estuarine-dependent.

Table 3-24: Aquatic Species With Essential Fish Habitat Within Study Area

Fishery Management Unit	Common Name	Scientific Name
Red Drum	Red drum	*Sciaenops ocellatus*
Shrimp	Brown shrimp	*Penaeus aztecus*
	White shrimp	*Penaeus setiferus*
	Pink shrimp	*Penaeus duorarum*
	Royal Red shrimp	*Penaeus robustus*
Stone Crab	Stone crab	*Menippe mercenaria*
	Gulf stone crab	*Menippe adina*
Coastal Migratory Pelagic Fisheries	King mackerel	*Scomberomorus cavalla*
	Spanish mackerel	*Scomberomorus maculates*
	Cobia	*Rachycentron canadum*
Reef Fish	Gray triggerfish	*Balistes capriscus*
	Greater amberjack	*Seriola dumerili*
	Lesser amberjack	*Seriola fasciata*
	Almaco jack	*Seriola rivoliana*
	Banded rudderfish	*Seriola zonata*
	Hogfish	*Lachnolaimus maximus*
	Queen snapper	*Etelis oculatus*
	Mutton snapper	*Lutjanus analis*
	Schoolmaster	*Lutjanus apodus*
	Blackfin snapper	*Lutjanus buccanella*
	Red snapper	*Lutjanus campechanus*
	Cubera snapper	*Lutjanus cyanopterus*
	Gray (mangrove) snapper	*Lutjanus griseus*
	Dog snapper	*Lutjanus jocu*
	Mahogany snapper	*Lutjanus mahogany*
	Lane snapper	*Lutjanus synagris*
	Silk snapper	*Lutjanus vivanus*
	Yellowtail snapper	*Ocyurus chrysurus*
	Wenchman	*Pristipomoides aquilonaris*
	Vermillion snapper	*Rhomboplites aurorubens*
	Goldface tilefish	*Caulolatilus chrysops*
	Blackline tilefish	*Caulolatilus cyanops*
	Anchor tilefish	*Caulolatilus intermedius*
	Blueline tilefish	*Caulolatilus microps*
	(Golden)tilefish	*Lopholatilus chamaeleonticeps*
	Dwarf sandperch	*Diplectrum bivattatum*
	Sandperch	*Diplectrum formosum*
	Rock hind	*Epinephelus adscensionis*
	Speckled hind	*Epinephelus drummondhayi*
	Yellowedge grouper	*Epinephelus flavolimbatus*
	Red hind	*Epinephelus guttatus*
	Goliath grouper	*Epinephelus itajara*
	Red grouper	*Epinephelus morio*
	Misty grouper	*Epinephelus mystacinus*
	Warsaw grouper	*Epinephelus nigritus*
	Snowy grouper	*Epinephelus niveatus*
	Nassau grouper	*Epinephelus striatus*
	Marbled grouper	*Epinephelus inermis*
	Black grouper	*Mycteroperca bonaci*
	Yellowmouth grouper	*Mycteroperca interstitialis*
	Gag	*Mycteroperca microlepis*
	Scamp	*Mycteroperca phenax*
	Yellowfin grouper	*Mycteroperca venenosa*

Source: http://www.nmfs.noaa.gov/habitat/habitatprotection/efh/GIS_inven.htm

Within the Gulf of Mexico, essential fish habitat has been divided into two classifications: estuarine areas and marine areas. Estuarine areas include all estuarine waters and substrates

(mud, sand, shell, rock and associated biological communities), including the sub-tidal vegetation (seagrasses and algae) and adjacent inter-tidal vegetation (marshes and mangroves). Marine areas include all marine waters and substrates (mud, sand, shell, rock, hardbottom and associated biological communities) from the shoreline to the seaward limit of the U.S. Exclusive Economic Zone. The essential fish habitat within the study area includes the entire Laguna Madre, which is classified as an estuarine area, and includes the following habitats: seagrass beds; mangrove wetlands; estuarine emergent wetlands; algal flats; estuarine mud, sand and shell substrates; and estuarine water column. Impacts to these habitats would impact managed species.

3.7.4 Threatened and Endangered Species

The purpose of this section is to provide a brief summary of the listing and monitoring procedures employed by the federal and state governments, to provide a list of threatened and endangered species potentially occurring in the study area, and to provide brief ecological descriptions of these sensitive resources.

3.7.4.1 List of Endangered and Threatened Species

The list of rare species potentially occurring in the proposed 2nd Access Project study area were obtained from lists and supplementary information from the USFWS (USFWS 2009i) and the Wildlife Diversity Program in the Wildlife Division of the TPWD (TPWD 2009b). Occurrence data was obtained from the TPWD Natural Diversity Database and is summarized in the species descriptions contained in this chapter. **Table 3-25** presents the current status of those sensitive species and footnotes below the table explain the rationale for the various classifications.

3.7.4.2 Potential Occurrences and Ecological Requirements

Table 3-25 presents federal and state listed threatened and endangered species that have been identified as potentially occurring in the study area. Species lists for Cameron County were obtained from the TPWD in September 2009. Reconnaissance level surveys were conducted in May 2008 to determine habitat availability within the study area for listed species. Additionally, USFWS was contacted in November of 2007 in regards to effects on federally endangered and threatened species. Their December 2008 response is located within **Appendix B**.

Table 3-25: Rare, Threatened and Endangered Species for Cameron County, Texas

Scientific Name	Common Name	USFWS Status*	TPWD Status**	Habitat Present
PLANTS				
Adelia vaseyi	Vasey's adelia	--		No
Ambrosia cheiranthifolia	South Texas ambrosia	E	E	Yes
Astrophytum asterias	Star cactus	--	E	No
Ayenia limitaris	Texas ayenia	E	E	Yes
Coryphantha macromeris var. *runyonii*	Runyon's cory cactus	--		No
Echeandia chandleri	Lila de los llanos	--		Yes
Echeandia texensis	Green Island echeandia	--		Yes
Grindelia oolepis	Plains gumweed	--		No
Heteranthera mexicana	Mexican mud-plantain	--		No
Justicia runyonii	Runyon's water-willow	--		Yes
Thelypodiopsis shinnersii	Shinner's rocket	--		Yes
Tillandsia baileyi	Bailey's ballmoss	--		Yes
AMPHIBIANS				
Hypopachus variolosus	Sheep frog	--	T	Yes
Leptodactylus fragilis	White-lipped frog	--	T	Yes
Notophthalmus meridionalis	Black-spotted newt	--	T	Yes
Siren sp. *1*	South Texas siren – large form	--	T	Yes
Smilisca baudinii	Mexican treefrog	--	T	Yes
BIRDS				
Aimophila botterii texana	Texas Botteri's Sparrow	--	T	Yes
Asturina nitida	Gray Hawk	--	T	Yes
Athene cunicularia hypugaea	Western Burrowing Owl			Yes
Buteo albicaudatus	White-tailed Hawk	--	T	Yes
Buteo albonotatus	Zone-tailed Hawk	--	T	No
Buteogallus anthracinus	Common Black-hawk	--	T	No
Camptostoma imberbe	Northern Beardless-tyrannulet	--	T	Yes
Charadrius alexandrinus	Snowy Plover	--		Yes
Charadrius alexandrinus nivosus	Western Snowy Plover	--		Yes
Charadrius alexandrinus tenuirostris	Southeastern Snowy Plover	--		Yes
Charadrius melodus	Piping Plover	T	T	Yes
Egretta rufescens	Reddish Egret	--	T	Yes
Falco femoralis septentrionalis	Northern Aplomado Falcon	E	E	Yes
Falco peregrinus anatum	American peregrine Falcon	--	T	Yes
Falco peregrinus tundrius	Arctic peregrine Falcon	--		Yes
Geothlypis trichas insperata	Brownsville Common Yellowthroat	--		Yes
Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	--	T	No
Icterus cucullatus sennetti	Sennett's Hooded Oriole	--		Yes
Icterus graduacauda audubonii	Audubon's Oriole	--		Yes
Mycteria americana	Wood Stork	--	T	Yes
Numenius borealis	Eskimo Curlew	--	E	Yes
Pachyramphus aglaiae	Rose-throated Becard	--	T	Yes
Parula pitiayumi	Tropical Parula	--	T	Yes
Pelecanus occidentalis	Brown Pelican	DM	E	Yes
Plegadis chihi	White-faced Ibis	--	T	Yes
Sterna antillarum athalassos	Interior Least Tern	--	E	Yes
Sterna fuscata	Sooty Tern	--	T	Yes
INSECTS				
Agapema galbina	Tamaulipan agapema	--		Yes
Cicindela chlorocephala smythi	Smyth's tiger beetle	--		Yes
Cicindela nigrocoerulea subtropica	Subtropical blue-black tiger beetle	--		Yes
Sphingicampa blanchardi	The royal moth	--		Yes
Stallingsia maculosus	Manfreda giant-skipper	--		Yes
FISH				
Anguilla rostrata	American eel	--		Yes
Awaous banana	River goby	--	T	Yes

Scientific Name	Common Name	USFWS Status*	TPWD Status**	Habitat Present
Ctenogobius claytonii	Mexican goby	--	T	Yes
Hybognathus amarus	Rio Grande silvery minnow	--	E	No
Microphis brachyurus	Opossum pipefish	--	T	Yes
Notropis jemezanus	Rio Grande shiner	--		No
Pristis pectinata	Smalltooth sawfish	--	E	Yes
MAMMALS				
Choeronycteris mexicana	Mexican long-tongued bat	--		Yes
Herpailurus yaguarondi	Jaguarundi	E	E	Yes
Lasiurus ega	Southern yellow bat	--	T	Yes
Leopardus pardalis	Ocelot	E	E	Yes
Mormoops megalophylla	Ghost-faced bat	--		Yes
Nasua narica	White-nosed coati	--	T	No
Oryzomys couesi	Coues' rice rat	--	T	Yes
Panthera onca	Jaguar	--	E	No
Spilogale putorius interrupta	Plains spotted skunk	--		Yes
Trichechus manatus	West Indian manatee	E	E	Yes
REPTILES				
Caretta caretta	Loggerhead sea turtle	T	T	Yes
Cemophora coccinea lineri	Texas scarlet snake	--	T	No
Chelonia mydas	Green sea turtle	T	T	Yes
Coniophanes imperialis	Black-striped snake	--	T	Yes
Dermochelys coriacea	Leatherback sea turtle	E	E	No
Drymarchon corais	Indigo snake	--	T	Yes
Drymobius margaritiferus	Speckled racer	--	T	Yes
Eretmochelys imbricata	Hawksbill sea turtle	E	E	Yes
Gopherus berlandieri	Texas tortoise	--	T	Yes
Holbrookia propinqua propinqua	Keeled earless lizard	--		Yes
Lepidochelys kempii	Kemp's ridley sea turtle	E	E	Yes
Leptodeira septentrionalis septentrionalis	Northern cat-eyed snake	--	T	Yes
Phrynosoma cornutum	Texas horned lizard	--	T	Yes
MOLLUSKS				
Popenaias popeii	Texas hornshell	C	T	No
Potamilus metnecktayi	Salina mucket	--	T	No
Quincuncina mitchelli	False spike mussel	--	T	No
Truncilla cognata	Mexican fawnsfoot mussel	--	T	No

Source: USFWS (January 9, 2009i), TPWD (July 16, 2009b)
*USFWS Listing Status – E – Endangered; T – Threatened; DM – Delisted Taxon, Recovered, Being Monitored First Five Years; C – Candidate for Listing; -- - not listed by the USFWS for Cameron County
**TPWD listing status – E – Endangered; T – Threatened; "blank" - Rare, but with no regulatory listing status

3.7.4.3 Occurrences and Ecological Requirements of Protected or Otherwise Sensitive Species

Plants

Vasey's adelia is a state listed rare species but is not currently under any regulatory protection. It occurs in subtropical evergreen/deciduous woodlands on loamy soils in the Lower Rio Grande Valley. It is known from Cameron, Hidalgo and Starr counties in Texas; however, almost its entire habitat has been destroyed within the past 50 years and it remains threatened by continued housing and agricultural development (Poole, et al. 2007). No suitable habitat for Vasey's adelia occurs within the study area.

South Texas ambrosia is a federal and state listed endangered species. The plant grows at low elevations in open clay loam to sandy loam prairies and savannas (Poole, et al. 2007). Historically, the species has been found in the following South Texas counties: Cameron, Jim

Wells, Kleberg and Nueces. The plant species status is currently unknown in Mexico. Original native habitat has been converted to agriculture fields, pastures or developed into urban areas. Introduced species such as buffel grass (*Pennisetum ciliare*) and yellow bluestem (*Bothriochloa ischaemum var. songarica*) compete with South Texas ambrosia, as well as other native vegetation. Suitable habitat for South Texas ambrosia occurs within the study area; however, there are no known occurrences.

Star cactus is a state listed endangered species. Typical habitat includes gravelly saline clays or loams over the Catahoula and Frio formations, and on gentle slopes and flats in grass or shrub lands (Poole, et al. 2007). The species has been known to occur in Cameron, Starr and Hidalgo counties, and in Nuevo Leon and Tamaulipas states in Mexico. Collection of wild specimens and loss of habitat has led to the extirpation of the species except in one known location in Starr County. No suitable habitat occurs for star cactus within the study area.

Texas ayenia is also a federal and state listed endangered species. It tends to grow in dense, relatively moist subtropical riparian woodlands with an overall canopy cover of 95 percent (Poole, et al. 2007). This species has been known to occur in Cameron and Hidalgo counties, as well as Coahuila and Tamaulipas states in Mexico. Habitat loss has occurred due to conservation and flood prevention efforts. Texas ayenia is not known to occur within the study area; however, suitable habitat occurs.

Runyon's cory cactus is a state listed rare species but is not currently under any regulatory protection. It is endemic to Texas and occurs on low hills and flats on gravelly soils in Tamaulipan shrub communities along the Rio Grande (Poole, et al. 2007). No suitable habitat for Runyon’s cory cactus occurs within the study area.

Lila de los llanos is a state listed rare species but is not currently under any regulatory protection. Lila de los llanos occurs on grasslands and openings in subtropical woodlands and brush on clay soils (Poole, et al. 2007). It is common in windblown saline clay on lomas near the mouth of the Rio Grande. Grazing, agriculture and housing development are the primary threats to this species. Lila de los llanos is known to occur within the study area.

Green Island echeandia is a state listed rare species but is not currently under any regulatory protection. It is most commonly encountered among shrubs or in grassy openings in subtropical thorn shrub lands on somewhat saline clay of lomas along the Gulf Coast near the mouth of the Rio Grande. Green Island echeandia typically flowers in April, June and November, but may also flower in other months (Poole, et al. 2007). Suitable habitat for Green Island echeandia occurs within the study area; however, there is no known occurrence of this species.

Plains gumweed is a state listed rare species but is not currently under any regulatory protection. It is endemic to Texas, and occurs in prairies and grasslands on black clay soils of the Gulf Coastal Bend, and may occur along railroad rights-of-way and in urban areas (Poole, et al. 2007). No suitable habitat for plains gumweed occurs within the project area.

Mexican mud-plantain is a state listed rare species but is not currently under any regulatory protection. It is an aquatic species that occurs in freshwater ditches and ponds where the plants are found creeping in mud or floating in shallow water (Poole, et al. 2007). No suitable habitat for Mexican mud-plantain occurs within the study area.

Runyon's water-willow is a state listed rare species but is not currently under any regulatory protection. It occurs on calcareous silt loam, silty clay, or clay in the openings of subtropical

woodlands on active or former floodplains (Poole, et al. 2007). It is known to occur in Brazoria, Hidalgo and Cameron counties in Texas, but few uncleared, appropriate woodland or thicket habitats remain in its range. Suitable habitat for Runyon's water-willow occurs within the study area; however, there is no known occurrence of this species.

Shinner's rocket is a state listed rare species but is not currently under any regulatory protection. It is mostly found along margins of Tamaulipan thorn-scrub on clay soils of the Rio Grande Delta, including lomas near the mouths of rivers (Poole, et al. 2007). It flowers mostly during March and April. Suitable habitat for Shinner's rocket occurs within the study area; however, there is no known occurrence of this species.

Bailey's ballmoss is a state listed rare species but is not currently under any regulatory protection (Poole, et al. 2007). Bailey's ballmoss is epiphytic on a variety of tree and shrub species in evergreen subtropical woodlands, Tamaulipan thorn-scrub, or oak mattes in coastal grasslands. This species is estimated to occur on approximately 50,000 acres in South Texas. Suitable habitat for Bailey's ball moss occurs within the study area, and this species occurs within the study area.

Amphibians

The sheep frog is a state listed threatened species. It is predominantly located in grassland and savanna habitats, but also occurs in moist sites in arid areas. The sheep frog is known to occur in moist burrows of subterranean mammals, under vegetative debris and around pond edges and irrigation ditches. Suitable habitat for the sheep frog occurs within the study area, and this species occurs within the study area.

The white-lipped frog is a state listed threatened species. This species occupies grasslands, cultivated fields, roadside ditches and a wide variety of other habitats in South Texas, and it often hides under rocks, in burrows, or within clumps of grass. Suitable habitat for the white-lipped frog occurs within the study area; however, there is no known occurrence of this species.

The black-spotted newt is a state listed threatened species. This species can be found in wet or sometimes wet areas, such as arroyos, canals, ditches, or shallow depressions and aestivates in the ground during dry periods. The black-spotted newt is distributed throughout the Gulf Coastal Plain south of the San Antonio River. Suitable habitat for the black-spotted newt occurs within the study area, and the species occurs within the study area.

The South Texas siren, large form, is a state listed threatened species. It inhabits wet or sometimes wet areas, such as arroyos, canals, ditches, or shallow depressions and aestivates in the ground during dry periods. It is distributed in southern Texas south of the Balcones Escarpment. Suitable habitat for the South Texas siren occurs within the study area, and the species occurs within the study area.

The Mexican treefrog is a state listed threatened species that is distributed throughout the subtropical region of extreme southern Texas, which is the northernmost part of its range. This species lays eggs in temporary rain pools. Suitable habitat for the Mexican treefrog occurs within the study area, and the species occurs within the study area.

Birds

The Texas Botteri's Sparrow is a state listed threatened species. It is an inhabitant of grasslands and short-grass plains with scattered bushes or shrubs, sagebrush, mesquite, or yucca. Its preferred nesting habitat includes dense grasses at least 1 foot tall, plus scattered

bushes, fence posts, or other structures used for perches. In South Texas, breeding pairs are most often found in tall bunchgrass. This species is a common spring and summer resident of the LANWR, and has been known to nest on the refuge. Suitable habitat for the Texas Botteri's Sparrow occurs within the study area, and the species occurs within LANWR.

The Gray Hawk is a state listed threatened species. This species can be found locally and irregularly along U.S.-Mexico border in mature riparian woodlands and nearby semi-arid mesquite and scrub grasslands. The Gray Hawks' breeding range formerly extended north to southernmost Rio Grande floodplain of Texas. Gray Hawks feed mainly on lizards, dropping on them from a perch. Suitable habitat for the Gray Hawk occurs within the study area; however, there is no known occurrence of this species.

The Western Burrowing Owl is a state listed rare species but is not currently under federal regulations or protection. Its preferred habitat is in open grasslands, especially prairies, plains and savannas. Sometimes it can be found in open areas such as vacant lots near human habitation or airports. It nests and roosts in abandoned burrows. Suitable habitat for the Western Burrowing Owl occurs within the study area; however, there is no known occurrence of this species.

The White-tailed Hawk is a state listed threatened species. Near the coast it is found on prairies, cordgrass flats and scrub live oak habitats. This species is an uncommon local resident along the Texas Coastal Plain. Suitable habitat for the White-tailed Hawk occurs within the study area, and the species occurs within the study area.

The Zone-tailed Hawk is a state listed threatened species that inhabits rough, deep, rocky canyons and stream sides in semi-arid mesa, hill and mountain terrain. No suitable habitat for the Zone-tailed Hawk occurs within the study area.

The Common Black-hawk is a state listed threatened species. It inhabits cottonwood-lined rivers and streams and willow tree groves on the lower Rio Grande floodplain. The largest threat to the Common Black-hawk is the alteration and elimination of riparian habitat. No suitable habitat for the Common Black-hawk occurs within the study area.

The Northern Beardless-tyrannulet is a state listed threatened species. It inhabits mesquite woodlands and frequents cottonwood, willow, elm and great leadtree near the Rio Grande. They often nest in clumps of mistletoe growing in trees, with the entrance to the nest on the side. This species is listed as a rare year-round visitor at the LANWR. Suitable habitat for Northern Beardless-tyrannulet occurs within the study area; however, there is no known occurrence of this species.

The Snowy Plover is a state listed rare species, but is not currently under any federal regulations. There are also two subspecies listed as state rare species, the Western Snowy Plover and the Southeastern Snowy Plover. This species is a winter migrant along the Texas Gulf Coast beaches and bayside mud or salt flats. They nest in shallow depressions on the open beach or salt flats and feed by probing on beaches and at the surf line. Suitable habitat for the Western Snowy Plover and the Southeastern Snowy Plover occurs within the study area; however, there is no known occurrence of these species.

The Piping Plover is a state listed threatened species. The USFWS lists it as endangered in parts of its range; however, those populations that occur in Texas are considered federally threatened. It is a winter migrant along the Texas Gulf Coast, and found on beaches and

bayside mud and salt flats. The primary threat to the Piping Plover is development of their habitat, which includes commercial, residential and recreational expansion. In order to help revive the population, critical habitat has been designated by USFWS on the Gulf Coast and ranges from Florida to Texas. Suitable habitat for the piping plover, including designated critical habitat, occurs within the study area, and the species occurs within the study area.

Mud and salt flats within the portions of the study area have been designated as critical habitat for the Piping Plover. These areas, in addition to other potential habitat areas, are shown on **Exhibit 3-15**.

Unit TX-3, South Padre Island: This unit is composed of two subunits (TX-3A and TX-3B). The southern boundary of both subunit is located at the northern boundary of at Andy Bowie County Park and the northern boundary is the south boundary of Padre Island National Seashore. Unit TX-3A incorporates the beach habitat on the Gulf of Mexico side of South Padre Island east of Park Road 100. Unit TX-3B has been designated for the sand and mud flats of the Laguna Madre west of Park Road 100.

The Reddish Egret is a state listed threatened species. It is a resident of the Texas Gulf Coast, and inhabits brackish marshes and shallow salt ponds and tidal flats. It nests on the ground or in trees or bushes, or on dry coastal islands in brushy thickets of yucca and prickly pear. Suitable habitat for the Reddish Egret occurs within the study area, and the species occurs within the study area.

The Northern Aplomado Falcon is both a federal and state listed endangered species. It inhabits the open country, such as savannas, open woodlands, grassy plains and valleys with scattered mesquite, yucca and cacti. The falcon nests in old stick nests of other bird species. They can be found in the South Texas and the Trans-Pecos regions of Texas. The majority of Northern Aplomado Falcons documented historically in the U.S. were from South Texas. The historical south Texas range included the salt prairies between Brownsville and Port Isabel. More recently, they are found mostly within the project study area. There have been successful efforts to reintroduce the Northern Aplomado Falcon into LANWR in Cameron County. Suitable habitat for the Northern Aplomado Falcon occurs within the study area, and the species occurs within the study area. Refer to **Exhibit 3-15** for Northern Aplomado Falcon habitat within the study area.

There are two subspecies of Peregrine Falcon that are listed as threatened or endangered in Cameron County. The American Peregrine Falcon is a state listed threatened species, while the Arctic Peregrine Falcon is a state listed rare species. Both were once federally listed species, but were delisted by USFWS in 1999. Both Peregrine Falcon subspecies inhabit the Texas coast as winter migrants. Suitable habitat occurs within the study area, and both species of Peregrine Falcons are known to occur within the study area.

The Brownsville Common Yellowthroat is a state listed rare species but is not currently under any federal regulations. This species inhabits tall grasses and brushes near ponds, marshes and swamps. Suitable habitat for the Brownsville Common Yellowthroat occurs within the study area; however, there is no known occurrence of this species.

The Cactus Ferruginous Pygmy-owl is a state listed threatened species. It usually nests in riparian trees, brush, palm and mesquite thickets, and roosts in small cave and recesses on slopes of low hills. The main threat to this species is the loss of oak woodlands for habitat. No suitable habitat for the Cactus Ferruginous Owl occurs within the study area.

Sennett's Hooded Oriole is a state listed rare species, but is not currently under any federal regulations. Sennett's Hooded Oriole is a summer resident and rare winter resident in South Texas, where it inhabits urban areas with palms. Suitable habitat for Sennett's Hooded Oriole occurs within the study area; however, there is no known occurrence of this species.

The Audubon's Oriole is a state listed rare species but is not currently under any federal regulations or protection. Its habitat is typically in scrub, mesquite; and nests in dense trees, or thickets, usually located along water courses. Suitable habitat for the Audubon's Oriole occurs within the study area; however, there is no known occurrence of this species.

The Wood Stork is a state listed threatened species. This species forages in prairie ponds, flooded pastures or fields, ditches and other shallow standing water, including saltwater. The Wood Stork usually roosts communally in tall snags. In the U.S., this species breeds predominantly in Florida and Georgia, chiefly in cypress or mangrove swamps. The Wood Stork also breeds in Mexico and moves into the gulf states in search of mudflats and other wetlands. Suitable habitat for the Wood Stork occurs within the study area, and the species occurs within the study area.

The Eskimo Curlew is a state listed endangered species. Eskimo Curlews migrate from breeding grounds in the Arctic tundra through the North American prairies to wintering grounds on the Pampas grasslands of Argentina. Conversion of native grasslands to cropland, in the South American wintering area and along the migration route through the tall grass prairies of the U.S., is thought to be the reason for the birds' failure to recover. Suitable habitat for the Eskimo Curlew occurs within the study area; however, there is no known occurrence of this species.

The Rose-throated Becard is a state listed threatened species. This species inhabits riparian trees, woodlands, open forest, scrubland and mangroves, but is predominantly found in large trees along rivers or streams. This bird spends most of its time foraging in tall trees. Suitable habitat for the Rose-throated Becard occurs within the study area; however, there is no known occurrence of this species.

The Tropical Parula is a state listed threatened species. The range of the Tropical Parula in the U.S. is limited to South Texas. This species inhabits dense or open woods, undergrowth, brush and trees along edges of rivers and resacas. Suitable habitat for the Tropical Parula occurs within the study area; however, there is no known occurrence of this species.

The Brown Pelican is a state listed endangered species and was recently delisted by USFWS, and still within its five year monitoring period. It is primarily a coastal species and does not venture far from the shoreline. Their nests are typically found in mangrove trees or similar size vegetation or on the ground and usually nest in colonies. Brown Pelicans can be found along the coast in California and from North Carolina to Texas, Mexico, the West Indies and many Caribbean Islands, and down to Venezuela and Guyana in South America. Feeding occurs in shallow estuarine waters, and offshore sandbars are used extensively as daily roost areas. The main cause for the Brown Pelicans decline was due to the use of DDT, a pesticide used in agricultural areas. The DDT would cause the birds to lay thin-shelled eggs which would break during incubation. Since DDT was banned in 1972, the Brown Pelican has made a steady comeback. In Texas the Brown Pelican occurs from Chambers County to Cameron County and primarily along the lower and middle coasts. Suitable habitat for the Brown Pelican occurs within the study area, and the species occurs within the study area.

The White-faced Ibis is a state listed threatened species. This species prefers freshwater marshes, sloughs and irrigated rice fields, but will also feed in brackish and saltwater habitats. It nests in small colonies, usually with other herons in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats. The White-faced Ibis breeds and winters along the Texas Gulf Coast, and is a common spring and fall inhabitant of the LANWR. Suitable habitat for this species occurs within the study area, and the species occurs within the study area.

The Interior Least Tern is a state listed endangered species whose historic distribution includes breeding sites on the sandbars of the Canadian, Red and Rio Grande River systems in Texas. Dams, reservoirs and other changes to river systems have eliminated most of the historic habitat. Now the bird occurs only in patches along their historic distribution and usually winter on the Texas Gulf Coast. Ideal nesting area can be salt flats, sandbars and barren shores along wide, shallow rivers. They prefer unvegetated nesting areas, but have been known to use areas with low vegetation cover no greater than 30 percent. Suitable habitat for the Interior Least Tern occurs within the study area; however, there is no known occurrence of this species.

The Sooty Tern is a state listed threatened species. This species is pelagic, meaning that it is an inhabitant of the open waters rather than the coastal areas. A predominantly "on the wing" feeder, it does not dive, but snatches small fish and squid with its bill as it flies or hovers over water. Suitable habitat for the Sooty Tern occurs within the study area. While there is no known occurrence of this species in the study area, it is known to nest near Port Isabel.

Insects

Tamaulipan agapema is a state listed rare species but is not currently under any federal regulations or protection. They range from the lower Rio Grande Valley of Texas west to southern Arizona and south to Tamaulipas and Baja California, Mexico. It is believed to be extinct in the U.S. and has not been reported to occur north of Mexico since the 1960s. Preferred habitat is Tamaulipan thorn-scrub with adequate densities of caterpillar food. Suitable habitat for the Tamaulipan agapema occurs within the study area; however, there is no known occurrence of this species.

Smyth's tiger beetle is a state listed rare species but is not currently under any federal regulations or protection. Tiger beetles are active and found in open, sunny areas. Adults are predaceous and feed on a variety of small insects; larvae are also predaceous and live in vertical burrows in soil of dry paths, fields, or sandy beaches. Suitable habitat for the Smyth's tiger beetle occurs within the study area; however, there is no known occurrence of this species.

Subtropical blue-black tiger beetle is a state listed rare species but is not currently under any federal regulations or protection. Most tiger beetles are active, usually brightly colored and found in open, sunny areas. Adult tiger beetles are predaceous and feed on a variety of small insects; larvae are also predaceous and live in vertical burrows in soil of dry paths, fields, or sandy beaches. Suitable habitat for the subtropical blue-black beetle occurs within the study area; however, there is no known occurrence of this species.

The royal moth is a state listed rare species but is not currently under any federal regulations or protection. Its range is from the lower Rio Grande Valley in Texas south into Mexico. The main threats to the royal moth are the spread of agriculture and housing which has resulted in less than 1 percent of original habitat remaining. Its habitat is in woodland/hardwoods but an important aspect is Texas ebony. Suitable habitat for the royal moths occurs within the study area; however, there is no known occurrence of this species.

Manfreda giant-skipper is a state listed rare species but is not currently under any federal regulations or protection. It inhabits subtropical thorn and pine forests in South Texas and Mexico. Suitable habitat for the Manfreda giant-skipper occurs within the study area; however, there is no known occurrence of this species.

Fish

The American eel is a state listed rare species but is currently not under federal regulation or protection. It occurs in a variety of habitats and is known to inhabit waters from Greenland to Brazil. American eels occur as far west as New Mexico, and are common throughout the Caribbean and the West Indies. Although it is native to much of Texas, the construction of dams, which impede upstream spawning migrations, has eliminated this species from most central and western areas of the state. Suitable habitat for the American eel occurs within the study area; however, there is no known occurrence of this species.

The river goby is a state listed threatened species. This species is a freshwater species that inhabits clear water with a slow to moderate current, a sandy or hard bottom and little or no vegetation. The river goby also enters brackish and ocean waters. Suitable habitat for the river goby occurs within the study area; however, there is no known occurrence of this species.

The Mexican goby is a state listed threatened species. The Mexican goby inhabits brackish and freshwater coastal streams. Suitable habitat for the Mexican goby occurs within the study area; however, there is no known occurrence of this species.

The Rio Grande silvery minnow is a state listed endangered species. It is believed to be extirpated from this region. Historically it could be found in the Rio Grande and Pecos River systems and canals, pools and backwaters of medium to large streams with low or moderate gradient in mud, sand, or gravel bottoms. The Rio Grande silvery minnow would ingest bottom ooze for algae and other organic matter and probably spawned on silt substrates of quiet coves. No suitable habitat for the Rio Grande silvery minnow occurs within the study area.

The opossum pipefish is a state listed threatened species. Brooding adults of this fish species are found in fresh or low salinity waters and the young move or are carried into more saline waters after birth. The freshwater habitats used for brooding include very specific vegetation, usually panicgrass *(Panicum* spp*.)* and smartweed *(Polygonum* spp*.)*. Suitable habitat for the opossum pipefish occurs within the study area; however, there is no known occurrence of this species.

The Rio Grande shiner inhabits the Rio Grande and upper Pecos River systems and canals. Preferred habitat includes large, open, weedless rivers or large creeks with rubble, gravel or sandy bottoms, often overlain with silt. No suitable habitat for the Rio Grande shiner occurs within the project area.

Depending on the life stage, the smalltooth sawfish inhabits areas close to shore with muddy and sandy bottoms in sheltered bays, shallow banks and in estuaries or mouths of rivers. Later in their life stage, the sawfish prefers mangroves and seagrass habitats in varying salinity regimes and water temperatures. Suitable habitat for the smalltooth sawfish occurs within the study area; however, there is no known occurrence of this species.

Mammals

The Mexican long-tongued bat is a state listed rare species but is not currently under federal regulation or protection. It occurs in a variety of habitats, including thorn-scrub, palo verde-

saguaro desert, semi-desert grassland, oak woodland and tropical deciduous forests, and is found in the southwestern U.S. through Mexico to El Salvador and Honduras. In the U.S., it occurs primarily in southern California (the San Diego area), southern Arizona, southwestern New Mexico, and the southern tip of Texas (Schmidly 2004). Suitable habitat for the Mexican long-tongued bat occurs within the study area. While there is no known occurrence of this species within the study area, there is known occurrence approximately 5.3 miles north of the study area.

The jaguarundi is a federal and state listed endangered species. This species is distributed throughout Cameron, Hidalgo, Starr and Willacy counties in South Texas, but is very rare (Schmidly 2004). The jaguarundi inhabits thick brush lands near water. The jaguarundi is endangered due to the loss of habitat from conversion to farmland or growth of cities. Suitable habitat for the jaguarundi occurs within the study area. The most recent local jaguarundi sighting was in 2005. Refer to **Exhibit 3-15** for jaguarundi habitat within the study area.

The southern yellow bat is a state listed threatened species. This bat species is associated with trees, such as palm trees, which provide them with daytime roosts. There is a known bat colony in a natural grove of palm trees near Brownsville, Texas in Cameron County. Additionally, this species may be increasing their range due to the increased usage of ornamental palms in landscaping (Schmidly 2004). Suitable habitat for the southern yellow bat occurs within the study area. While there is no known occurrence of this species within the study area, there is known occurrence approximately 10.8 miles south of the study area.

The ocelot is a federal and state listed endangered species. The ocelot inhabits dense, almost impenetrable chaparral thickets, mesquite scrub and live oak mottes. Historical records indicate that the ocelot once occurred throughout South Texas, the southern Edwards Plateau, and along the Coastal Plain; currently, the ocelot is found in South Texas brush country and the Rio Grande Valley. Some of the last remaining occupied ocelot habitat occurs within the study area. There are currently 13 confirmed resident ocelots at the LANWR (Sternberg and Mays 2011). Refer to **Exhibit 3-15** for ocelot habitat within the study area.

The ghost-faced bat is a state listed rare species but is not currently under federal regulation or protection. It is found in a variety of habitats including desert scrub, mixed boreal-tropical forests, tropical rain forests and riparian areas with mature cottonwood, sycamore and willow in oak-woodland habitat. Ghost-faced bats roost primarily in caves or abandoned mines and occasionally in old buildings. It inhabits humid, semi-arid and arid regions below 10,000 feet elevation from southwestern Texas and southern Arizona southward through Baja California and mainland Mexico into eastern Honduras and El Salvador. Suitable habitat for the ghost-faced bat occurs within the study area; however, there is no known occurrence of this species.

The white-nosed coati is a state listed threatened species. This species inhabits woodlands and canyons and forages on the ground and in trees. In Texas, this species is rarely spotted from Brownsville to the Big Bend region of the Trans-Pecos (Schmidly 2004). No suitable habitat for the white-nosed coati occurs within the study area.

Coues' rice rat is a state listed threatened species. This species inhabits cattail-bulrush salt and freshwater marshes with shallow zones of aquatic grasses near the shoreline. Shade trees along the shoreline are also important habitat features. The rice rat builds its nest in cattails and small trees near or above the water, and is threatened by the loss of habitat due to land draining for agriculture (Schmidly 2004). Suitable habitat for the Coues' rice rat occurs within the study area; however, there is no known occurrence of this species.

The jaguar is a state listed endangered species. The jaguar inhabits the dense chaparral and timbered sections of the tropics and seldom ventures into the high, cooler inland areas. The jaguar was once fairly common in south and east Texas; however, the last verified records of the jaguar in Texas are from near the turn of the twentieth century. This species is now extirpated from the state (Schmidly 2004). No suitable habitat for the jaguar occurs within the study area.

The plains spotted skunk is a state listed rare species but is not currently under federal regulation or protection. This species inhabits open fields, prairies, croplands, fencerows, farmyards, forest edges and woodlands, and prefers wooded, brushy areas and tall grass prairies. Suitable habitat for the plains spotted skunk occurs within the study area; however, there is no known occurrence of this species.

The West Indian manatee is a federal and state listed endangered species. This species inhabits the gulf and bay system, and is an opportunistic aquatic herbivore. The manatee is extremely rare in Texas, but was once common in the Laguna Madre. The manatee inhabits salt and fresh water and feeds on submergent vegetation, predominantly seagrasses in saltwater habitats (Schmidly 2004). Suitable habitat for the manatee occurs within the study area, and this species is known to occur in the Laguna Madre.Refer to **Exhibit 3-15** for West Indian manatee habitat within the study area.

Reptiles

The loggerhead sea turtle is a federal and state listed threatened species. Loggerheads are global, inhabiting continental shelves, bays, estuaries and lagoons in temperate, subtropical and tropical waters. They are capable of living in a variety of environments, such as in brackish waters of coastal lagoons and river mouths. During the winter, loggerheads may remain dormant, buried in the mud at the bottom of sounds, bays and estuaries. The major nesting beaches are located in the southeastern U.S., primarily along the Atlantic coast of Florida, North Carolina, South Carolina and Georgia. Suitable habitat occurs for the loggerhead sea turtle within the study area, and the species occurs in the Laguna Madre. Refer to **Exhibit 3-15** for loggerhead sea turtle habitat within the study area.

The Texas scarlet snake is a state listed threatened species. The species resembles the coral snake, but it has a red snout, while the coral's snout is black. It is seldom seen above ground and feeds on young mice, lizards and snakes. The Texas scarlet snake habitat consists of mixed hardwood scrub on sandy soils and is active April through September (Tennant 1998). No suitable habitat for the Texas scarlet snake occurs within the study area.

The green sea turtle is a state listed threatened species. The USFWS lists it as endangered in parts of its range; however, those populations that occur in Texas are considered federally threatened. This species is found in the southeastern U.S., around the U.S. Virgin Islands, Puerto Rico and the continental U.S. from Texas to Massachusetts (NOAA Fisheries and USFWS 2007). During the day, green sea turtles feed in the seagrass beds that grow in shallow waters, and at night, they sleep on the shallow bottom and sometimes out of the water on rocky ledges. The turtles migrate from nesting areas to feeding grounds, which are sometimes several thousand miles away. Most turtles migrate along the coasts, but some populations are known to migrate across the ocean from nesting area to feeding grounds. The major nesting beaches are always found in places where the seawater temperature is greater than 25 degrees Celsius. Green sea turtles are found throughout the Gulf of Mexico and are an occasional visitor to the Texas Gulf Coast. Suitable habitat for the green sea turtle occurs within

the study area, and the species occurs in the project area. Refer to **Exhibit 3-15** for green sea turtle habitat within the study area.

The black-striped snake is a state listed threatened species that inhabits extreme South Texas. Its preferred habitat consists of the semi-arid coastal plain with warm, moist microhabitats and sandy soils (Tennant 1995). This species is a proficient burrower. This species is secretive and burrows into the soil or takes refuge under vegetative debris during the day. Suitable habitat for the black-striped snake occurs within the study area. While there is no known occurrence of this species in the study area, there is known occurrence 5.6 miles southwest of the study area.

The leatherback sea turtle is a federal and state listed endangered species. This species is the largest of the sea turtles and can reach lengths of 6–8 feet. The leatherback is a highly pelagic species that moves into coastal waters only during the reproductive season, although small groups may move into coastal waters following concentrations of jellyfish (Eckert 1992). They are distributed throughout the Gulf of Mexico, but are a rare visitor to the Texas Gulf Coast. No suitable habitat for the leatherback sea turtle occurs within the Laguna Madre; however, suitable nesting habitat occurs on the Gulf side of South Padre Island.

The indigo snake is a state listed threatened species. This species inhabits the thorn bush-chaparral woodlands of South Texas, in particular dense riparian corridors (Tennant 1995). The indigo snake can do well in suburban and irrigated croplands if not molested or indirectly poisoned. It requires moist microhabitats, such as rodent burrows, for shelter. They may be found in the mesquite savannah, thorn brush woodlands, grassy plains and coastal sandhills. Suitable habitat for the indigo snake occurs within the study area. Suitable habitat for the indigo snake occurs within the study area, and this species occurs in the LANWR.

The speckled racer is a state listed threatened species that inhabits extreme South Texas. Its preferred habitat includes dense thickets near water, Texas palm groves, and riparian woodlands, and is often found in areas with surplus vegetative litter on the ground (Tennant 1995). Suitable habitat for the speckled racer occurs within the study area; however, there is no known occurrence of this species.

The hawksbill sea turtle is a federal and state listed endangered species. This species lives in clear offshore waters of mainland and island shelves, and is more abundant in areas where coral reefs are present (NOAA Fisheries and USFWS 2007). The hawksbill sea turtle is found in the Gulf of Mexico and is a rare visitor to the Texas Gulf Coast. Suitable habitat for the hawksbill sea turtle occurs within the study area, and nesting has occurred historically on Padre Island. Refer to **Exhibit 3-15** for hawksbill sea turtle habitat within the study area.

The Texas tortoise is a state listed threatened species. The Texas tortoise inhabits open scrub woods, arid brush, lomas and grass-cactus associations, and prefers open brush with a grass under story (Ernst and Barbour 1972). This tortoise uses depressions at the base of cactus or underground burrows or hides under surface cover. Suitable habitat for the Texas tortoise occurs within the study area, and the species occurs in the study area.

The keeled earless lizard is a state listed rare species. The keeled earless lizard inhabits the coastal dunes of barrier islands and other sandy areas. Suitable habitat for the keeled earless lizard occurs within the study area, and the species occurs in the study area.

Kemp's ridley sea turtle is a federal and state listed endangered species. The Kemp's ridley sea turtle occurs mainly in coastal areas of the Gulf of Mexico and northwestern Atlantic Ocean.

The only known natural nesting beach for this species is along the Gulf Coast of eastern Mexico where females nest in large groups called "arribizones" (NOAA Fisheries and USFWS 2007). Suitable habitat for the Kemp's ridley sea turtle occurs within the study area, and the species is known to occur in the study area. Refer to **Exhibit 3-15** for Kemp's ridley sea turtle habitat within the study area.

The northern cat-eyed snake is a state listed threatened species that inhabits the Gulf Coastal Plain south of the Nueces River. This species lives in thorn brush woodlands and dense thickets bordering ponds and streams (Tennant 1998). Suitable habitat for the northern cat-eyed snake occurs within the study area; however, there is no known occurrence of this species.

The Texas horned lizard is a state listed threatened species. This species is known to occur in open arid or semi-arid regions with sparse vegetation within grass, cactus, scattered brush or scrubby trees, and is distributed throughout Texas, including the barrier islands (Bartlett and Bartlett 1999). The Texas horned lizard burrows into the soil, uses rodent burrows, or hides under surface cover and is commonly found in loose sands or loamy soils. Suitable habitat for the Texas horned lizard occurs within the study area; however, there is no known occurrence of this species.

Mollusks

The Texas hornshell is a state listed threatened species and has critical habitat within Cameron County. It is found from western gulf and Mexican gulf coastal drainages of the Rio Grande Basin south to the northern Estado de Vera Cruz, Mexico (USFWS 2003b). As most freshwater mussels, Texas hornshells require clean, flowing water. They are very sensitive to environmental changes and serve as indicators of aquatic ecosystem health and integrity. Habitat modification, in the form of mainstream impoundments, water pollution and sedimentation, has been linked with the drastic decline of freshwater mussels in North America. No suitable habitat for the Texas hornshell occurs within the study area.

The Salina mucket is a state listed threatened species but is not currently under federal regulations or protection. It can be found in flowing waters in submerged soft sediment. Other habitat requirements are poorly understood, but it is known to occur in the Rio Grande Basin. No suitable habitat for the Salina mucket occurs within the study area.

The false spike mussel is a state listed threatened species but is not currently under federal regulations or protection. It can be found in substrates of cobble and mud where water lilies are present (Howells, et al. 1996). River basins historically known to have habitat include the Rio Grande, Brazos, Colorado and Guadalupe. No suitable habitat for the false spike mussel occurs within the study area.

The Mexican fawnsfoot mussel is a state listed threatened species but is currently not under federal regulations or protection. The species is largely unknown. Due to its absence in reservoirs, it could be intolerant of impoundments and needs flowing streams or rivers with sand or gravel bottoms. Historically, it has been found in the Rio Grande Basin. No suitable habitat for the Mexican fawnsfoot mussel occurs within the study area.

3.7.4.4 Marine Mammal Protection Act

The Marine Mammal Protection Act of 1972 prohibits (with some exceptions) the "taking" of marine mammals in U.S. waters by any person and by U.S. citizens in international waters and

on the importing of marine mammals and marine mammal products into the U.S. (16 United States Code, Section 1361–1407). "Take" is defined in the Marine Mammal Protection Act as "harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect." The Marine Mammal Protection Act was amended in 1981 to provide for "incidental take" authorizations for small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographic region, provided NOAA Fisheries finds the takings 1) would be of small numbers, 2) have no more than a "negligible impact" on marine mammals, and 3) have no "unmitigable adverse impact" on subsistence harvests of these species. Section 101(a)(5) of the Marine Mammal Protection Act, as amended, provides a process by which citizens of the U.S. can apply for an authorization to incidentally take small numbers of marine mammals by "harassment", referred to as Incidental Harassment Authorizations. Level A Harassment has the potential to injure a marine mammal or marine mammal stock in the wild. Level B Harassment has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild.

Marine mammals (bottlenose dolphins and West Indian manatee) and their potentially suitable habitats are present within the study area in the Laguna Madre; therefore, the provisions of the Marine Mammal Protection Act would apply. Proposed construction activities have the potential for harassment of manatees moving through the area, therefore this issue will be included in the consultation with the USFWS.

3.8 CULTURAL RESOURCES

An assessment has been conducted to identify cultural resources within the survey study area. Research has centered upon the identification of prehistoric and historic archeological sites and non-archeological historic-age resources (buildings, structures, objects and districts). To date, the following detailed identification and evaluation reports have been prepared and are on file at TxDOT's Environmental Affairs Division office:

Research Design - Non-Archeological Historic-Age Resources Survey - South Padre Island Second Access
Non-Archeological Historic-Age Resources Reconnaissance Survey Report - South Padre Island Second Access: From State Highway 100 West of Port Isabel Extending across the Laguna Madre to Park Road 100 on South Padre Island

3.8.1 Regulatory Compliance

3.8.1.1 Section 106 and Antiquities Code of Texas

Cultural resources are structures, buildings, archeological sites, districts (a collection of related structures, buildings, and/or archeological sites), cemeteries and objects. Both federal and state laws require consideration of cultural resources during project planning. At the federal level, National Environmental Policy Act (NEPA) and the National Historic Preservation Act (NHPA) of 1966 (Section 106), among others, apply to transportation projects such as this one.

In accordance with the Advisory Council on Historic Preservation regulations pertaining to the protection of historic properties (36 CFR 800.4), federal agencies are required to identify and evaluate historic-age resources for National Register of Historic Places (NRHP) eligibility and assess the effects that the undertaking would have on sites, buildings, structures, objects or

districts that are listed in or determined eligible for inclusion in the NRHP. If the agency head and the State Historic Preservation Officer agree that a property potentially affected by a proposed project is NRHP eligible, then they are required to apply the *Criteria of Adverse Effect* found in 36 CFR Section 800.5 to such a property. Under this regulation, an "adverse effect is found when an undertaking may alter directly or indirectly, any of the characteristics of the property that make it eligible for the NRHP." An adverse effect may be found when such characteristics are altered "in a manner that would diminish the integrity of a property's location, design, setting, materials, workmanship, feeling or association." If an adverse effect is determined, then the regulations require the federal agency and the State Historic Preservation Officer to seek ways to avoid the property, minimize the impacts, and mitigate for effects.

These steps shall be completed under terms of the December 29, 2005 Programmatic Agreement for Transportation Undertakings among Federal Highway Administration (FHWA), the Texas State Historic Preservation Officer (SHPO), Advisory Council on Historic Preservation, and TxDOT. The Programmatic Agreement for Transportation Undertaking outlines a streamlined approach for Section 106 consultation and review with the Texas State Historic Preservation Officer.

At the state level, this project also falls under the purview of the Antiquities Code of Texas, because it may involve "lands owned or controlled by the State of Texas or any city, county, or local municipality thereof." The Texas Antiquities Code allows for all such properties to be considered as State Archeological Landmarks (SALs), and requires that each be examined in terms of possible "significance." Significance standards for the code are clearly outlined under Chapter 26 of the Texas Historical Commission's (THC's) Rules of Practice under Procedure for the Antiquities Code of Texas and closely follow those of the Secretary of Interior's Standards and Guidelines. Compliance with these laws often requires consultation with the THC/Texas State Historic Preservation Officer (SHPO) and/or federally-recognized tribes to determine the project's approved procedures for compliance with federal and state laws. Historic properties will be considered under the provisions of the Memorandum of Understanding (MOU) between the SHPO and TxDOT.

3.8.2 Prehistoric and Historic Archeology

An archeological background review was conducted within the study area for the project. The background review included a review of site files at the Texas Archeological Research Lab, the files at the THC, the Texas Archeological Sites Atlas, the Texas Historic Sites Atlas, and the TxDOT Historic Overlay maps. Additionally, the review included a review of the NRCS soil maps and the Soil Survey of Cameron County, Texas (Williams, et al. 1977), the Bureau of Economic Geology's Geologic Atlas of Texas McAllen-Brownsville Sheet (Barnes 1976), La Coma, Port Isabel and Laguna Vista, Texas USGS 7.5-minute topographic quadrangle maps, planning documents, and aerial photography of the study area.

Archeological Sites

- Site 41CF39 is located on the southern banks of the De La Gringa Resaca on the mainland. The site consists of shell and fish otoliths and recommendations on the site form include further testing of the site (Atlas).
- Site 41CF104 is located on South Padre Island. The site consists of a single Paleo-Indian Meserve point located on the bank of the Gulf of Mexico (Atlas). No recommendations were stated regarding site significance or further work.

Shipwrecks

- An unknown vessel (#1531) which was recorded in 1975 as archaeological site (41CF110) is located within the study area. The site form dates the shipwreck to the last half of the 19th century and recommends the site eligible for NRHP and State Archaeological Landmark nomination.
- The Startlan vessel (#2333) was identified in the study area and is a ship that was lost in 1949. The shipwreck is located on the gulf side of South Padre Island.
- An unknown vessel (#1081) that pre-dates 1977 is recorded on the outer periphery of the Gulf Intracoastal Waterway.
- An unknown shipwrecked vessel that pre-dates 1977 (#1083) is recorded on the outer periphery of the Gulf Intracoastal Waterway.

3.8.2.1 Coordination

A TxDOT archeologist will evaluate the potential for the proposed undertaking to affect archeological historic properties or State Archeological Landmarks in the area of potential effect. Section 106 review and consultation will proceed in accordance with the First Amended Programmatic Agreement among the FHWA, TxDOT, the Texas State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Implementation of Transportation Undertakings, as well as the Memorandum of Understanding between the THC and TxDOT. In the event that unanticipated archeological deposits are encountered during construction, work in the immediate area will cease and TxDOT archeological staff will be contacted to initiate post-review discovery procedures under the provisions of the Programmatic Agreement and Memorandum of Understanding. Native American Tribal Consultation will be initiated by TxDOT. Native American tribes that will need to be consulted as part of this project, in accordance with 36 CFR 800 include the Apache Tribe of Oklahoma, Comanche Nation of Oklahoma, Kiowa Indian Tribe of Oklahoma, the Mescalero Apache Tribe, and the Tonkawa Tribe of Indians of Oklahoma.

Informal coordination with the State Historic Preservation Officer has been initiated for archeological resources via a letter dated October 7, 2009. The letter requested any additional information or comments relating to ongoing research, points of interest, or high probability areas within the study area. This letter does not serve to initiate formal consultation with the State Historic Preservation Officer under Section 106 of the National Historic Preservation Act or the Texas Antiquities Code. The State Historic Preservation Office responded to this letter on November 11, 2009, and will coordinate directly with TxDOT-ENV pursuant to the Programmatic Agreement with TxDOT, the THC, and FHWA, and the Memorandum of Understanding with TxDOT.

3.8.3 Non Archeological Historic-Age Resources

3.8.3.1 Previous Investigations

Previous investigations include *South Padre Island Second Access Study Area Constraints Report* prepared in 2008. The study area for this report extended from Clark Island on the southeast to San Ramon Road on the southwest. It then extended north to the southern tip of the Laguna Atascosa then directly east across the Laguna Madre to South Padre Island and thence due south to Clark Island. In addition, the *Environmental Assessment for General Brant Highway/Buena Vista Road* (FM 106 Extension, 2004) previously prepared by TxDOT Pharr District was reviewed.

3.8.4 Methodology

The Secretary of the Interior's guidelines for NRHP eligibility prescribes a criterion of 50-year old properties for consideration for inclusion in the NRHP. The Programmatic Agreement for Transportation Undertakings among the FHWA, the Advisory Council on Historic Preservation, the State Historic Preservation Officer, and TxDOT also calls for a 50-year cutoff date for historic-age. However, TxDOT Environmental Affairs Division suggests a 45-year cutoff (45 years prior to the letting date) in the guidelines provided in the September 8, 2006 draft of *Historic Resources Section 106 Review and NEPA Guide* to allow for unforeseen delays in letting. Accordingly, the term "historic-age resource," as it is used in this report, refers to any buildings, structures, objects and potential historic districts that are, or will be, 45 years of age or older at the time of project letting for construction. Because the projected letting date for this project is 2015, 1970 was the cutoff date used for determining which buildings and structure resources met the historic-age criterion.

3.8.4.1 Desktop Review

Constraints Identification

The purpose of the 2008 *South Padre Island Second Access Study Area Constraints Report* was to identify recorded historic resources (those listed in the NRHP or eligible for listing in the NRHP) and historic-age resources (buildings, sites, structures, objects, districts, etc.) identified within the study area for the proposed 2nd Access Project. It also identified historic contexts that could apply within the study area and suggested areas in which historic resources within these contexts may be found upon more extensive evaluation.

Desk Top Review

A TxDOT pre-certified architectural historian conducted a desktop records review of the study area during June and July 2008. Repositories consulted include the State Historic Preservation Office *Historic Sites Atlas* to identify any previously recorded historic resources within the project area. Specifically, the historian searched for locations of designated historic and historic-age resources in the following databases:

- NRHP
- Official Texas Historical Markers
- Recorded Texas Historical Landmarks
- State Archeological Landmarks
- Historic Cemeteries

3.8.5 Decision Making: Applying the NRHP Criteria

3.8.5.1 NRHP Requirements

The following criteria, as described in 36 CFR Section 60.4, are used to evaluate resources 50 years of age or older for eligibility in the NRHP:

"The quality of significance in American history, architecture, archeology, engineering, and culture is present within districts, sites, building, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association and

(A) That are associated with events that have made a significant contribution to the broad patterns of our history; or
(B) That are associated with the lives of persons significant in our past; or

(C) That embody the distinctive characteristics of type, period, or method of construction, or that represent a work of a master, or that possess high artistic value, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
(D) That have yielded, or may be likely to yield, information important in prehistory or history."

Within the study area there is one NRHP listed property, the Port Isabel Lighthouse, and one NRHP eligible property, the old 1936 Point Isabel Lighthouse Centennial Marker.

3.9 HAZARDOUS MATERIALS

This section identifies potential sources of hazardous materials contamination located within the study area. An existing release, past release or material threat of a release of hazardous or petroleum substances, collectively referred to herein as hazardous materials, into the ground, groundwater or surface water could pose health and safety risks to construction workers and vicinity residents during project construction. In addition, such conditions, if left unabated, could become exacerbated by the project construction operations, potentially resulting in further impacts to human and ecological receptors. As such, hazardous materials contamination is subject to NEPA mandates of avoidance, minimization or mitigation.

3.9.1 Hazardous Materials Sites

3.9.1.1 Regulatory Database Research

The hazardous materials sources identified in this section reflect the results of regulatory database queries provided by Banks Environmental Data, Inc (2010). The regulatory databases are maintained in electronic storage formats by federal and state agencies and contain geo-coded (geographic information system capable) information pertaining to a variety of hazardous materials releases or potential releases. The databases include EPA, TCEQ and Railroad Commission of Texas listings of sites where hazardous materials are suspected to have been stored, used and/or released to the environment. The federal and state databases that were reviewed are described below. Copies of the 2010 commercial database query reports are included in **Appendix E**.

Table 3-26 lists the federal and state agency databases that were searched within the minimum search distances from the study area, as set by American Society for Testing and Materials (ATSM) E 1527-05. The ASTM standard search distances are included in the table. For the purposes of identifying potential hazardous materials, all records within the ASTM search distance of the study area were documented.

Table 3-26: Federal and State Agency Databases

Database	Description	Search Radius (miles)	Sites Per Database
Federal			
National Priority List (NPL)	The NPL is a list of the worst hazardous waste sites that have been identified by Superfund.	1.00	0
Delisted National Priority List (DNPL)	Database of delisted NPL sites.	0.50	0
Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS)	Database of potential and confirmed hazardous waste sites at which the EPA Superfund program has some involvement.	0.50	4
Comprehensive Environmental Response, Compensation, and Liability Information System No Further Remedial Action Planned (CER NFRAP)	Database of Archive designated CERCLA sites that, to the best of the EPA's knowledge, assessment has been completed and has determined no further steps will be taken to list this site on the NPL.	0.50	0
RCRA Information System - Corrective Action (RCRA COR ACT)	Database of hazardous waste information contained in the Resource Conservation and Recovery Information (RCRAInfo), a nation program management and inventory system about hazardous waste handlers.	1.00	1
RCRA Information System - Treatment, Storage, & Disposal (RCRA TSD)	This RCRIS database contains information relating to permitted hazardous waste TSD facilities.	0.50	3
RCRA Information System – Generators (RCRA GEN)	This RCRIS database contains information relating to facilities that are registered by the EPA to generate and/or transport hazardous wastes.	0.25	0
Federal Engineering and Institutional Controls (Federal IC/EC)	This database collects, tracks and updates information, as well as reports on the major activities and accomplishments of the various Brownfield grant programs.	0.50	0
Emergency Response Notification System (ERNS)	The ERNS contains data on reported releases of oil and hazardous substances, as identified by the National Response Center.	0.25	0
Tribal Lands	Database of areas recognized by the Federal government as territory in which American Indian tribes have primary governmental authority.	1.00	14
State			
State/Tribal Sites	TCEQ sites, which may constitute an imminent and substantial endangerment to public health and safety or to the environment due to a release of hazardous substances into the environment.	1.00	0
State/Tribal Solid Waste Disposal or Landfill (SWLF)	TCEQ listing of all permitted solid waste landfills, transfer stations and incinerators.	0.50	4
State/Tribal Leaking Underground Storage Tanks (LPST)	TCEQ listing of leaking underground petroleum storage tanks.	0.50	22
State/Tribal Underground/Aboveground Storage Tanks (PST)	TCEQ listing of all underground/aboveground petroleum storage tanks.	0.25	64
State/Tribal Engineering Controls (EC)	TCEQ listing of sites in the Voluntary Cleanup Program and the Innocent Owner/Operator Program that have engineering controls placed on them.	0.50	1
State/Tribal Institutional Controls (ST IC)	TCEQ listing of sites in the Voluntary Cleanup Program and the Innocent Owner/Operator Program that have institutional controls placed on them.	0.25	0
State/Tribal Voluntary Cleanup Program (VCP)	TCEQ listing of all sites in the Voluntary Cleanup Program and the Innocent Owner/Operator Program.	0.50	2

Database	Description	Search Radius (miles)	Sites Per Database
State/Tribal Brownfields	TCEQ/EPA listing of former industrial properties that lie dormant or underutilized due to liability associated with contamination.	0.50	0
State Other (IHW)	TCEQ listing of Texas Industrial Hazardous Waste Notice of Registration data.	0.25	6
State Other (RCRA)	This database lists all sites that fall under the RCRA and are not classifiable as treatment, storage, disposers of hazardous material, hazardous waste generator or subject to corrective action activity.	0.25	4

Source: Banks Environmental Data, Environmental FirstSearch Report™ (January 5, 2010)

As a result of the Banks regulatory database search, 125 records were identified in federal and state databases. A site may contain more than one record. Refer to **Appendix E** for the Banks regulatory database report (2010). Of these 125 records, 118 geocoded and seven non-geocoded (unmappable) sites were identified. Sites are listed as non-geocoded when their exact location could not be plotted, but they are identified as being located within the general area of the alignments based on the submitted property information. The Valley Metals Recycling Company site was listed as a ST IC and a VCP within the Banks regulatory database search; however, the site was incorrectly documented as located within the study area and was removed from further discussion in this document. The remaining 123 records located within the study area are discussed below. **Exhibit 3-16** depicts the location of the geocoded hazardous materials and oil/gas wells identified in the Banks regulatory database search.

Within the study area, hazardous materials sites are clustered within the City of Port Isabel and on the southern end of South Padre Island. Development in the City of Port Isabel and South Padre Island is both industrial and recreational in use. Commercial properties identified within the Banks regulatory database search include industrial chemical and oil and gas industries, recreational and commercial maritime activities, and related support services. Of the 123 hazardous materials records identified in the Banks regulatory database search, four CER NFRAP sites (three non-geocoded), one RCRA TSD, three RCRA GEN, 14 ERNS, four SWLF, 22 LPST, 64 PST (three non-geocoded), one VCP, four RCRA (one non-geocoded), and six IHW were documented. The four CER NFRAP sites are commercial marine and industrial facilities. The RCRA TSD is not a generator. The three RCRA GEN sites are small quantity generators. The ERNS records are related to marine and boating activities, and have been cleaned or removed. Of the four SWLF properties, two are owned by Cameron County and two are owned by the City of Port Isabel. The LPST sites are generally located within wharves, marinas, gas stations, and automobile maintenance yards, as are the documented PSTs. The documented RCRA sites are not generators and have no listed corrective actions. Five of the six documented IHW sites are listed as closed or inactive. The sixth documented IHW site, located in South Padre Island, is active and also listed as a RCRA TSD. None of the hazardous materials records identified within the Banks regulatory database search were within the ASTM standard search distances of the proposed ROWs of the build alternatives.

3.9.1.2 Visual Site Inspection

In the Fall of 2009, a field investigator verified the location of three petroleum storage tank sites within the study area that were not geocoded in an earlier database report from 2009. These three sites included: Port Isabel Service Processing Center (h1), Port Isabel Cameron County Airport (h2), and Southshore Automotive (h3). These three petroleum storage tank sites are denoted on **Exhibit 3-16**. Within the 2010 Banks regulatory database report referenced for this

project, Southshore Automotive is listed under the name Island Gulf. Both the Island Gulf site and the Port Isabel Cameron County Airport site were geo-coded in the 2010 Banks regulatory database report. The Port Isabel Service Processing Center was listed, but not geocoded, and no violations were listed for any of the three sites (Banks 2010). All three sites are located greater than 0.250 miles from the build alternatives. Therefore, all three are outside of the ASTM standard search distances for this regulatory database.

3.9.2 Oil/Gas Well Sites

The Railroad Commission of Texas database contains information relating to regulated oil and gas exploration and production sites, including active as well as plugged and abandoned wells. Such features have been identified with hazardous materials impacts including hydrocarbon and brine releases to soil, groundwater and surface water. The Railroad Commission of Texas Oil and Gas database search and a Banks Environmental Data, Inc. database search were conducted on January 6, 2010. The report is included in **Appendix E**. Oil and gas well casings and drill shafts are installed both on land as well as into the marine environment, and constitute potential sources of petroleum contamination even after they are plugged and abandoned; therefore, the search included the Laguna Madre and the island and mainland shorelines.

There were a total of 56 well clusters, including 25 gas wells, identified within the study area search radius (Banks 2010). These 56 well clusters included one producing well, one permitted well, 15 plugged wells, 13 sidetrack wells (wells that are drilled vertically and then pumped horizontally), 35 dry holes (non-producing wells), and three wells with an unknown status. Most of the gas wells within the study area search radius were located within the Laguna Madre. **Exhibit 3-16** depicts the location of each oil and gas well, or well cluster, site.

3.10 VISUAL AND AESTHETIC QUALITIES

FHWA's Technical Advisory T6640.8A recommends that whenever a potential for visual impacts exists from a proposed transportation project, the environmental study should identify the potential visual impacts to the adjacent land uses as well as measures to avoid, minimize or mitigate these potential visual impacts. The process used to assess the visual and aesthetic impacts for the proposed 2nd Access Project generally follows the guidelines outlined in the *FHWA's Visual Impact Assessment for Highway Projects* (FHWA 1988).

3.10.1 Project Setting

The visual environment study area establishes the general visual environment of the project. The following description of the visual environment study area addresses both landform and land cover.

The visual environment study area (**Exhibit 3-17**) is located in the eastern portion of Cameron County. The mainland portion of the study area (western portion) is characterized by low lying prairies, croplands, dense thorn-scrub brush and wetlands. These areas border the Laguna Madre, South Bay, the Bahia Grande and other subtidal, intertidal and freshwater systems. Several lomas or potreros (elevated landforms surrounded by wind-tidal flats such as Loma de Grulla east of Laguna Vista Cove and Loma de la Palangana and Loma del Islote in Port Isabel) occur throughout the study area. These lomas range from 10–30 feet in height and comprise the majority of the landscape relief in the area.

Man-made visual features on the mainland are concentrated at Port Isabel, Laguna Heights, Laguna Vista and near the Port Isabel Cameron County Airport. The Port Isabel Lighthouse,

Queen Isabella Memorial Causeway marinas and shipping channel activity dominate the landscape surrounding the Port Isabel area. The 72-foot tall Port Isabel Lighthouse (with the base at 15 feet in elevation) and the Queen Isabella Memorial Causeway, approximately 85 feet in elevation are the most noticeable features in the Port Isabel area. Ships of varying design and heights are scattered throughout the Port Isabel area including the Black Dragon measuring 57 feet at its tallest mast and numerous shrimp boats.

The Laguna Madre portion of the study area (central portion) is an important visual and recreational element and is located in the central portion of the study area. On the South Padre Island (eastern portion) portion of the study area, the landscape is a barrier island with a mean elevation of approximately 5–10 feet and dune heights up to 20 feet. The eastern side of the island is exposed to the Gulf of Mexico and is comprised of a high wave-energy beach backed by sand dunes that are exposed to wind and water. The western side of the island is comprised of relatively wide sand and salt flats that extend from the dunes to the Laguna Madre.

3.10.2 Landscape Units

A landscape unit is a portion of the regional landscape of the study area and can be thought of as an outdoor room that exhibits a distinct visual character. A landscape unit will often correspond to a place or district that is commonly known among local viewers. These landscape units provide the framework for analyzing the effects of the proposed 2nd Access Project and developing appropriate impact mitigation measures. There are three units on the mainland and two on South Padre Island.

The landscape units for the proposed 2nd Access Project are shown in **Exhibit 3-17** and include:

- Shrimp Farm/Buena Vista Drive Area Landscape Unit
- West Laguna Vista Area Landscape Unit
- Holly Beach Landscape Unit
- South Padre Island (North) Landscape Unit
- South Padre Island (South) Landscape Unit

A summary of the characteristics of each landscape unit is provided below.

3.10.2.1 Shrimp Farm/Buena Vista Drive Area Landscape Unit

The Shrimp Farm/Buena Vista Drive Area Landscape Unit encompasses the area in the vicinity of the shrimp farm and Buena Vista Drive in the western portion of the visual environment study area. This landscape unit is characterized by flat natural topography, with large portions of undeveloped land in the southeastern and southwestern portions. The dominant feature is a shrimp farm with spans much of the northern half of the unit. There are scattered commercial and residential developments in the western portion, an immigration detention center in the northern portion, and an abandoned river bed in the northwest corner.

3.10.2.2 West Laguna Vista Area Landscape Unit

The West Laguna Vista Area Landscape Unit encompasses the area in the vicinity of the western portion of Laguna Vista in the southwestern portion of the visual environment study area. The landscape unit is characterized by flat natural topography, with large portions of undeveloped land in the western portion, residential development and a golf course in the eastern portion. The landscape unit also includes lakes in the northwestern and southeastern portions.

3.10.2.3 Holly Beach Landscape Unit

The Holly Beach Landscape Unit encompasses the area in the vicinity of the Holly Beach area in the central portion of the visual environment study area. The western portion of the landscape unit is characterized by flat natural topography and undeveloped land and the eastern portion consists of the Laguna Madre.

3.10.2.4 South Padre Island (North) Landscape Unit

The South Padre Island (North) Landscape Unit encompasses the area in the vicinity of South Padre Island in the eastern portion of the visual environment study area. The western portion of the landscape unit consists of the Laguna Madre, the central portion is characterized by sand dunes on undeveloped land with the Andy Bowie County Park at the southern end, and the eastern portion consists of the Gulf of Mexico.

3.10.2.5 South Padre Island (South) Landscape Unit

The South Padre Island (South) Landscape Unit encompasses the area in the vicinity of South Padre Island in the northeastern portion of the visual environment study area. The western portion of the landscape unit consists of the Laguna Madre, the central portion is characterized by high density residential development, hotel and motel developments, and large portions of undeveloped land, while the eastern portion consists of the Gulf of Mexico.

3.10.3 Project Viewshed

A viewshed is a subset of a landscape unit and is comprised of all the surface areas visible from an observer's viewpoint. The limits of a viewshed are defined as the visual limits of the views located from the proposed project. The viewshed also includes the locations of viewers likely to be affected by visual changes brought about by project features. Potential viewsheds extend out into the surrounding area. The viewsheds for the proposed project include locations within the five landscape units where viewers are likely to be affected by visual changes brought about by the project features. For the purposes of this analysis, viewsheds are the areas defined by the boundaries of the five landscape units.

3.10.4 Existing Visual Resources and Quality

The visual quality of the existing visual resources was evaluated by identifying the vividness, intactness, and unity present in the viewshed. FHWA states that this method should correlate with public judgments of visual quality well enough to predict those judgments. This approach is particularly useful in transportation planning because it does not presume that a highway project is necessarily an eyesore. This approach to evaluating visual quality can also help identify specific methods for mitigating specific adverse impacts that may occur as a result of a project. The three criteria for evaluating visual quality as defined in the guidance are as follows:

Vividness is the visual power or memorability of landscape components as they combine in distinctive visual patterns.

Intactness is the visual integrity of the natural and man-built landscape and its freedom from encroaching elements. It can be present in well-kept urban and rural landscapes, as well as in natural settings.

Unity is the visual coherence and compositional harmony of the landscape considered as a whole. It frequently attests to the careful design of individual components in the landscape.

Table 3-27 shows the results of the existing visual quality analysis results for the five landscape units within the visual environment study area followed by summaries of the results.

Table 3-27: Existing Visual Quality Within Landscape Units

Landscape Unit	Existing Visual Quality						
	Very Low	Low	Moderately Low	Average	Moderately High	High	Very High
Shrimp Farm/Buena Vista Drive Area			●				
West Laguna Vista Area				●			
Holly Beach					●		
South Padre Island (North)					●		
South Padre Island (South)					●		

Source: HNTB 2009

3.10.4.1 Shrimp Farm/Buena Vista Drive Area Landscape Unit

The visual quality of this landscape unit is "moderately low" because of the presence of scattered residential and commercial land uses. The flat natural topography with views of undeveloped land exhibits an "average" degree of vividness. The presence of encroaching visual elements such as scattered residential and commercial land uses, an immigration detention center, and a shrimp farm exhibit a "moderately low" degree of intactness and unity.

3.10.4.2 West Laguna Vista Area Landscape Unit

The visual quality of this landscape unit is "average" because of the presence of the South Padre Island Golf Club/Community and lakes. The flat natural topography with views of undeveloped land, lakes, a golf course and residential development exhibits an "average" degree of vividness, intactness and unity.

3.10.4.3 Holly Beach Landscape Unit

The visual quality of this landscape unit is "moderately high" because of the presence of Laguna Madre. The flat natural topography with views of undeveloped land and the Laguna Madre exhibits a "moderately high" degree of vividness, intactness and unity.

3.10.4.4 South Padre Island (North) Landscape Unit

The visual quality of this landscape unit is "moderately high" because of the presence of Laguna Madre and the Gulf of Mexico. The flat natural topography with views of undeveloped land, the Laguna Madre and the Gulf of Mexico exhibits a "moderately high" degree of vividness, intactness and unity.

3.10.4.5 South Padre Island (South) Landscape Unit

The visual quality of this landscape unit is "moderately high" because of the presence of Laguna Madre and the Gulf of Mexico. The flat natural topography with views of undeveloped land, high density residential development, the Laguna Madre and the Gulf of Mexico exhibits a "moderately high" degree of vividness, intactness and unity.

3.11 AIRPORTS

To comply with Federal Aviation Administration Order 5050.4B, every construction project that extends 200 feet or greater above natural terrain or is located within 5 miles of an airport,

requires that a notice be filed with the Federal Aviation Administration. The Port Isabel Cameron County Airport is located within the study area (**Exhibit 1-2**).

3.12 NAVIGATION

The Gulf Intracoastal Waterway is a 1,300-mile-long shallow draft waterway extending from St. Marks, Florida to Brownsville, Texas. This man-made transportation channel was completed in 1949. Designed primarily for barge traffic, the Gulf Intracoastal Waterway is 125-feet wide and 12-feet deep. The Gulf Intracoastal Waterway is used for both recreational (fishing, boating, skilling) and commercial purposes (movement of cargo, commercial fishing, etc.).

The Texas portion of the Gulf Intracoastal Waterway is 423 miles long. In 2006, over 74 million short tons of cargo (a short ton equals 2,000 pounds) - having a total commercial value of more than $25 billion – were moved on the Texas portion of the waterway.

The Gulf Intracoastal Waterway is a vital link in the transportation network of the project area. There are three ports, within or near the project area, which rely on the Gulf Intracoastal Waterway for access: Port of Brownsville, Port Isabel/San Benito Navigation District and the Port of Harlingen. Although there is no single, comprehensive source for barge data, information provided by the Port of Brownsville indicates that 5,718 barges have traveled the Gulf Intracoastal Waterway to "call" at the Port since 2003 (**Table 3-28**). Barge traffic to the Port Isabel/San Benito Navigation District is minimal.

Table 3-28: Port of Brownsville Barge Traffic

Year	Number of Barges Utilizing the Gulf Intracoastal Waterway
2003	551
2004	574
2005	757
2006	463
2007	760
2008	733
2009	506
2010	657
2011 (Jan – Oct)	717

Source: Port of Brownsville 2011

The existing Queen Isabella Memorial Causeway is currently the only structure spanning the Gulf Intracoastal Waterway in the project area. The existing causeway has a vertical clearance of 73-feet above the mean high tide and a horizontal clearance of 275-feet (between fenders).

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

LIST OF TABLES

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

This chapter assesses the potential direct effects (or "impacts") that would result from construction and operation of the proposed 2nd Access Project. Direct effects are defined by the Council on Environmental Quality (CEQ) regulations as those effects that "are caused by the action and occur at the same time and place". An example of a direct effect would be the acquisition of right-of-way (ROW), placement of roadway and bridge structures, the clearing of vegetation for construction staging and access, dredging of work access channels, relocation of oil and gas pipelines and/or wells, and the installation of roadway safety lighting.

4.1 LAND USE IMPACTS

A detailed land use analysis was conducted for the reasonable alternatives (11 build alternatives and the No-Build Alternative). The analysis included reviews of recent aerial photography, site reconnaissance in the vicinity of the build alternatives and gathering land use data from local planning documents. In addition to consulting planning documents, meetings were held with city and county officials throughout the study area to obtain information on planning activities. These meetings are documented in **Chapter 8**.

4.1.1 Compatibility with Local Plans and Policies

4.1.1.1 No-Build Alternative

The No-Build Alternative would be incompatible with the *Town of South Padre Island, Texas, Comprehensive Plan* (Town of South Padre 2008) and the *Cameron County Regional Mobility Authority Strategic Plan, 2007–2011* (Cameron County Regional Mobility Authority [CCRMA] 2006). Both of these plans include specific reference to the proposed 2nd Access Project. Although the planning documents for the City of Port Isabel, City of Brownsville and Town of Laguna Vista do not include specific reference to the proposed project, these jurisdictions generally support the construction of the proposed 2nd Access Project and have formally stated support for the project during public scoping meetings, technical working groups, Context Sensitive Solutions community workshops and one-on-one meetings, as discussed in **Chapter 8**. If the proposed 2nd Access Project is not constructed, local plans would have to be modified to provide other means of mobility.

4.1.1.2 Build Alternatives

The purpose of the proposed 2nd Access Project is to facilitate congestion management during peak travel periods and emergency evacuations, provide the infrastructure necessary to support economic development, enhance safety and mobility (both locally and regionally), and to deliver the much needed transportation system improvements in an environmentally sensitive manner. Local planning documents prepared for the project area emphasize the need for increased mobility and economic development of the region, and the proposed project is included in the *Town of South Padre Island, Texas, Comprehensive Plan* (Town of South Padre 2008) and the *Cameron County Regional Mobility Authority Strategic Plan, 2007-2011* (CCRMA 2006).

The build alternatives are compatible with the principles expressed in the local planning documents. Both the *Town of South Padre Island, Texas, Comprehensive Plan* (Town of South Padre 2008) and the *Cameron County Regional Mobility Authority Strategic Plan, 2007–2011* (CCRMA 2006) include specific references to the proposed 2nd Access Project.

4.1.2 Direct Land Use Impacts

4.1.2.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by the Texas Department of Transportation (TxDOT) and local entities. Although these projects would result in land use impacts, the extent of these impacts cannot be determined at this time. Under the No-Build Alternative, there would be no 2nd Access Project-related land use impacts.

4.1.2.2 Build Alternatives

The primary direct impact on land use from the build alternatives is the conversion of land to transportation ROW. All of the build alternatives would result in long-term changes in land use where existing land use would be converted to transportation ROW. Site visits were conducted during 2009 to confirm the existing land uses within the project area. The 11 reasonable alternatives would convert a range of approximately 175.60 acres (Alternative 11) to 240.59 acres (Alternative 6) from existing land uses to transportation ROW. As shown in **Table 4-1** and **Exhibit 4-1**, the land uses anticipated to be predominantly impacted would be undeveloped land (ranging from approximately 64.73–149.99 acres) and agricultural (ranging from approximately 17.47–131.10 acres).

Undeveloped Land
Undeveloped land is the predominant land use that would be impacted by all of the reasonable alternatives on the mainland and on the island. Undeveloped land is defined as unincorporated, privately owned and undeveloped areas; this form of land use is dominant on both the mainland and the island. The amount of undeveloped land that would be impacted would range from a low of 64.73 acres (Alternative 8) to a high of 149.99 acres (Alternative 3). Alternative 6 would impact 146.59 acres of undeveloped land.

Agricultural
Alternatives 1, 4 and 8, which share a common alignment on the mainland, would have the highest impact on agricultural land (resulting in the conversion of 131.10 acres of agricultural land use to ROW). The remaining alternatives would result in impacts to agricultural land use ranging from approximately 17.47 acres (Alternatives 7 and 11) to 91.91 acres (Alternative 6). Included in the impact calculations for Alternatives 1, 4 and 8 are impacts to an existing shrimp farm. All of the build alternatives would subdivide agricultural fields, resulting in the possibility that these fields could become economically unproductive.

Residential
The area of residential land converted to ROW would range by alternative. The most residential land impacted would be for Alternative 11 (49.69 acres), while Alternatives 1, 3, 4 and 6 would not require the conversion of residential property to ROW. Much of the residential land that would be converted to ROW is within the unbuilt sections of the master planned communities, which are discussed in **Section 3.1.4.4**. Additionally, **Section 4.2.1.2** discusses the impacts to master planned communities. **Section 4.2.3.2** discusses actual residential displacements that would result from each of the alternatives.

Commercial
When comparing impacts to existing commercial land, there is little difference between the build alternatives. Alternatives 2, 5, 7, 9 and 11 would impact the least amount of commercial

property (0.15 acres) while Alternatives 1, 4, and 8 would impact the most (2.09 acres each). Alternative 6 would impact 2.08 acres of commercial property. Refer to **Section 4.2.3.2** for an assessment of commercial/business displacements that would result from each of the build alternatives.

Industrial

Although there is industrial land use within the proposed 2nd Access Project study area, none of the reasonable alternatives would impact (encroach upon) industrial lands. The proposed project would not result in direct impacts to industrial land uses.

Public Land/Parks

Although there are public land/parks located within the proposed 2nd Access Project study area, none of the reasonable alternatives would impact (encroach upon) any of these locations. This includes Andy Bowie Park, which would not be impacted by any of the reasonable alternatives. The proposed project would not result in direct impacts to public land/park land uses.

Table 4-1: Summary of Land Use Impacts

Alternative	Land Use Category (acres)				
	Undeveloped	Residential	Commercial	Agricultural	Transportation
No-Build	0.00	0.00	0.00	0.00	0.00
1	103.00	0.00	2.09	131.10	156.45
2	142.83	31.70	0.15	53.33	122.19
3	149.99	0.00	2.08	86.70	147.80
4	96.91	0.00	2.09	131.10	132.57
5	136.74	31.70	0.15	53.33	98.31
6	146.59	0.00	2.08	91.91	130.76
7	140.75	31.70	0.15	17.47	98.69
8	64.73	17.99	2.09	131.10	74.53
9	104.57	49.68	0.15	53.33	40.26
10	114.13	17.99	2.08	91.92	72.71
11	108.30	49.69	0.15	17.47	40.64

Source: HNTB 2009
Note: All quantities shown are in acres and represent the amount of each land use category within the existing and proposed ROW.

Utilities

No-Build Alternative

The No-Build Alternative would not result in utilities impacts associated with the construction or operation of the proposed project.

Build Alternatives

As discussed in Chapter 3, there are five known natural gas pipelines within the study area. Each of the reasonable alternatives would cross at least one of the natural gas pipelines. It is unknown at this time if any of the pipelines would require relocation due to construction impacts. Alternative 6 could potentially have three pipeline crossings (**Exhibit 4-20**). There is a possibility of unmapped pipelines that might occur within the recommended preferred alternative

and would require relocation. More detailed studies regarding pipelines and potential relocation would be determined during the final design phase of project development.

Other utilities within the project area include cable, conduit, fiber-optic, water lines, sanitary sewer lines, cell towers and overhead transmission lines. The project team has coordinated with utility companies to obtain information and mapping on known utility systems within the project area. Known utilities would be mapped using geographic information systems and avoided to the extent practicable during the development of the recommended preferred alternative. Additional information would be gathered during schematic design development of the recommended preferred alternative to determine the potential impacts to utilities within the proposed ROW. Specific impacts to utilities would be determined during the final design phase of project development. Should impacts to utilities result in the relocation of certain facilities, the project sponsor (CCRMA) would coordinate with utility owners regarding roles and responsibilities regarding any required relocation. Every attempt would be made to accommodate proposed utility adjustments within the project ROW.

Coastal Barrier Resources Act Impacts
The No-Build Alternative would not result in Coastal Barrier Resources Act lands impacts associated with the construction or operation of the proposed project.

None of the reasonable alternatives would impact lands designated under the Coastal Barrier Resources Act; thus, there would be no direct impact to Coastal Barrier Resources.

Section 4(f) of the Department of Transportation Act of 1966
The No-Build Alternative would not result in Section 4(f) impacts associated with the construction or operation of the proposed project.

Andy Bowie Park is located within the study area and adjacent to the island landing of Alternatives 8-11. All of the build alternatives involve upgrading Park Road 100 which traverses Andy Bowie Park within state-owned ROW. Andy Bowie Park is designed for outdoor recreation including swimming, surfing and other sports. Upgrading Park Road 100 in the vicinity of the park would not substantially impair the use of the park for its intended purpose. All of the reasonable build alternatives have been designed to avoid park property. **Exhibit 3-3** shows the location of Andy Bowie Park in relation to the reasonable build alternatives, as well as to other public lands and parks within the study area.

None of the reasonable alternatives would require the acquisition of land from any park, recreation area, or waterfowl or wildlife refuge, or substantially impair the historic integrity of an historic site. Further, none of the reasonable alternatives would result in proximity impacts that would be so severe as to substantially impair the use of the Section 4(f) property. There would be no constructive use impacts to Section 4(f) properties as a result of the proposed project.

4.2 SOCIAL AND ECONOMIC IMPACTS

This section describes the anticipated community and social impacts that would be expected to result from the No-Build Alternative and the build alternatives. These impacts include community cohesion, displacements and proximity impacts, such as traffic noise impacts and visual and aesthetic quality. Additional environmental justice impacts are also described. Impacts identified here are generalized and may not be uniform for all residences within a neighborhood or residential area. Impacts may be more pronounced or less pronounced depending on the proximity of each residence to a proposed alternative.

Each of the alternatives would have some degree of impact on existing neighborhoods and residential areas. In some cases, impacts would include the displacement and required relocation of one or more residence, business or facility in a neighborhood, and in others, proximity of the build alternative may be the only impact. In most cases, however, proximity would result in multiple impacts including increased noise and visual intrusion.

4.2.1 Impacts to Neighborhoods and Other Residential Areas

4.2.1.1 No-Build Alternative

The proposed 2nd Access Project would not be constructed under this alternative. Therefore, no project-related impacts to communities would occur within the study area. However, the No-Build Alternative would likely impact some communities by the increase in traffic congestion that is expected to occur on the Queen Isabella Memorial Causeway in the absence of the proposed project.

The City of South Padre Island and the City of Port Isabel would most likely be denied this benefit among communities in the study area as stakeholders from both communities indicate that the communities need to relieve traffic congestion and improve accessibility and mobility to advance their respective goals. Safety considerations related to evacuation routing also necessitates The City of South Padre Island's need, and the No-Build Alternative would deny the City those benefits. As stated in **Chapter 1**, there are multiple concerns regarding the safety of having only one vehicular access route to the island. A hurricane bearing toward South Padre Island would require the evacuation of the entire island; and in emergencies, gridlock can occur on the island, as well as on the mainland, when all outbound traffic utilizes one access route and State Highway (SH) 100.

The Town of Bayview, according to its Mayor, would likely benefit from the No-Build Alternative because the proposed reasonable alternatives would not direct additional traffic through the Town and thereby would not jeopardize the rural character of the community, nor would it provide a traffic safety hazard through the community. The Town of Laguna Vista and the community of Laguna Heights would likely be denied some benefit with the No-Build Alternative as commute times on SH 100 and the Queen Isabella Memorial Causeway to job centers in the City of Port Isabel and the City of South Padre Island would continue to climb as a result of increased traffic congestion. Additionally, the Towns of Laguna Vista and South Padre Island would be unable to capitalize on expanding tax revenue generating development to areas where development would be spurred as a result of the proposed 2nd Access Project. Overall and among all communities in the study area, the No-Build Alternative may result in a detriment to air quality and an increase in noise levels.

4.2.1.2 Build Alternatives

A range of impacts to existing residential areas and community facilities are anticipated as a result of the proposed action. These impacts include displacements (**Section 4.2.3**), community cohesion (**Section 4.2.2**), community conditions (**Section 4.2.13**), proximity impacts such as residential impacts (discussed below), traffic noise impacts (**Section 4.3**), and visual and aesthetic quality (**Section 4.10**). Additional impacts are also described in **Section 4.2.10 (Impacts to Social Groups: Environmental Justice Considerations)**. Impacts identified here are generalized and may not be uniform for all residences within neighborhoods or residential areas. Impacts may be more pronounced or less pronounced depending on the proximity of each residence to a proposed alternative. In addition, noise levels are expected to increase

along the build alternatives. For detailed information on traffic noise impacts, refer to **Section 4.3 (Traffic Noise Impacts)**.

As a result of the proposed project, some project-related impacts to communities within the study area would likely occur. The Cities of South Padre Island and Port Isabel would both realize improvements to traffic congestion that would improve mobility and accessibility as well as improve safety related to evacuation routing in the event of a hurricane. These improvements would contribute to both communities' specific planning goals. The proposed project would likely contribute to the Town of Laguna Vista's goal to leverage tax revenue by generating development in areas north of the Town where the project would tie into the mainland. As a result of the proposed project, the Town of Bayview could realize increased traffic; thus, conflicting with the Town's goal of preserving its rural character and avoiding potential commercial development that otherwise would not take advantage of heightened land premiums resulting from increased traffic and visibility. The unincorporated community of Laguna Heights may realize some benefit as residents traveling to job centers in both the Cities of Port Isabel and South Padre Island would likely encounter reduced traffic congestion on trips to work that may effectively reduce commute times and corresponding commuting costs. Specific impacts of the build alternatives for each community within the study area and the potential impacts' relationships to the communities' goals are provided in the **Section 4.2.13**.

Each of the build alternatives would have some degree of adverse impact on existing individual neighborhoods or residential areas. In some cases, impacts include the displacement and required relocation of one or more residences, businesses, or facilities in a neighborhood, and in others, proximity of the build alternative may be the only impact. In most cases, however, proximity would result in multiple impacts including increased noise and visual intrusion.

There are two master planned communities within the project area, The Shores on South Padre Island and the South Padre Island Golf Club/Community on the mainland would be directly impacted by several of the reasonable alternatives. Specifically, Alternatives 8, 9, 10 and 11 would impact The Shores master planned community, and Alternatives 2, 5, 7, 9 and 11 would impact the South Padre Island Golf Club/Community. Alternative 6 would not impact The Shores master planned community or the South Padre Island Golf Club/Community.

Direct impacts from Alternatives 8, 9, 10 and 11 to The Shores would include the conversion of approximately 17.75 acres of currently undeveloped residential property to ROW. Direct impacts to The Shores include the loss of 76 platted home sites and associated streets, as well as the loss of the private recreational facility, including the community swimming pool, which has been constructed. *"The Shores Master Plan"* (Franke, Inc.; Realtors 2009) identifies the area that would be converted to ROW as Marina Village II, and states that the area is currently under construction. However, a field visit in December 2009 revealed that there are currently no homes constructed; roads and the private recreational facility are the only components constructed to date. Additionally, the area specified as future construction of the Marina Townhomes would be converted to ROW, as would the southernmost point of Island #1, which is designated as a future phase of The Shores Master Planned Community.

Direct impacts from Alternatives 2, 5, 7, 9 and 11 to the South Padre Island Golf Club/Community would include the conversion of approximately 31.70 acres of currently undeveloped residential property to ROW. The area of the community that would be impacted is at the northernmost reach of Country Club Drive. The *"South Padre Island Golf Community Master Plan"* (Landmark National 2007) does not include a name for this portion of the master planned community.

Proximity Impacts

In addition to impacts associated with the conversion of land to ROW (such as displacements), community impacts would also occur due to "proximity" to the proposed facility. By considering proximity to the proposed facility, the project team was able to consider the effects - whether real or perceived - associated with nearness to roadway. As a means of quantifying potential proximity impacts, the project team calculated the amount of existing and proposed residential property located outside of, but within 400 feet of, the ROW footprint for each alternative.

Alternatives 2, 5, 7, 9, and 11 have the highest potential proximity impacts (ranging from approximately 90.63–128.46 acres within 400 feet of an alternative) to existing and proposed neighborhoods and residential areas. Less than 6 acres of residential property would be located within 400 feet of Alternatives 1, 3, 4 and 6. Approximately 37.98 acres and 43.51 acres of residential property would be located within 400-feet of Alternatives 8 and 10, respectively. **Table 4-2** includes a summary of the proximity impacts to neighborhoods and residential areas.

Table 4-2: Potential Neighborhood and Residential Area Proximity Impacts

Alternative	Proximity Impact (acres)
No-Build	0.00
1	0.26
2	90.63
3	5.80
4	0.26
5	90.63
6	5.79
7	90.73
8	37.98
9	128.35
10	43.51
11	128.46

Source: HNTB 2009

4.2.2 Impacts to Community Cohesion

4.2.2.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although these projects would result in community cohesion impacts, the extent of these impacts cannot be determined at this time. Under the No-Build Alternative, there would be no 2nd Access Project-related community cohesion impacts.

If alternative solutions are not developed, the South Padre Island area would continue to experience an overall increase in congestion on the Queen Isabella Memorial Causeway and approaching roadways. The long-term cohesion of the community at large and the interactive linkages between communities, especially between the City of Port Isabel and the City of South Padre Island, may be affected by not building the proposed project. Local communities desire an additional access point to the island in order to encourage more visitors through easier access and positively impact the tourist-driven economy. Study area communities also aspire to improve accessibility to mutually-dependent social, economic, educational, institutional, and cultural activities, services, and facilities. Future neighborhoods or neighborhood expansions would partially continue to develop in accordance with local land use planning policies and

zoning requirements. However, the construction of the second access is inherent to the planning and development goals and land use policies of the majority of study area communities and municipalities.

4.2.2.2 Build Alternatives

Communities within the proposed 2nd Access Project study area are characterized by varying degrees of cohesion based on socioeconomic factors. Strong community cohesion is characterized by extensive interaction among neighbors and friends, participation in community activities and organizations, and involvement in local government and politics. Transportation and land use planning decisions can affect community cohesion by influencing the location of activities and the quality of the "public realm" (i.e., places where people naturally interact, such as sidewalks, local parks and public transportation), and therefore, the ease with which neighbors meet and build positive relationships (Litman 2007). Typically, cohesive communities have several generations of families, extended families and strong informal (non-governmental) social support networks which can provide for child care, emergency assistance and spiritual guidance, among many other possibilities.

The overall impact of the proposed 2nd Access Project can be expected to have minor negative impacts and more pronounced positive impacts. A potential negative impact would result from the proposed tolled bay crossing. The crossing could render longer driving distances for some members of adjacent communities who would continue to utilize the existing non-tolled access route rather than paying the toll. However, those distances would be no longer than distances currently traveled by community residents who rely on the only existing crossing from the mainland to the island.

The Laguna Madre serves as a physical barrier separating neighborhoods and communities on the island from neighborhoods and communities on the mainland. Even so, project area neighborhoods and communities are linked by shared social, economic, educational, institutional, and cultural services, activities and facilities. The proposed project would enhance interaction between the mainland and the island by providing a second access to these shared facilities.

The construction of a second access would likely shift many regional trips away from the Queen Isabella Memorial Causeway and relieve congestion and improve accessibility and mobility between the mainland and the island, specifically between the City of Port Isabel and the City of South Padre Island. Such an improvement in mobility along the Queen Isabella Memorial Causeway would likely alleviate an existing obstacle for residents of communities on both sides of the Laguna Madre to connect and interact. Community services, activities, and facilities associated with schools, the Cameron County Health Department office, the Port Isabel Library, the Cameron County Parks office and associated South Padre Island park system, and other facilities mentioned in **Section 3.2.1.8** would likely become more accessible for residents on both sides of the Laguna Madre.

Additionally, the proposed build alternatives would not create a new physical barrier between communities within the study area because the 11 reasonable alternatives generally do not traverse specific communities or population clusters. Further, residents of study area communities would utilize existing roadways. The core of each community and neighborhood within the study area would remain intact with the possibility of only minor physical disruption, if any at all, depending on which alternative is identified as the recommended preferred alternative. Alternatives 2, 5, 7, 9, and 11, which traverse the far northwestern portion of the

Town of Laguna Vista and the far western portion of the developing South Padre Island Golf Club/Community, would likely present the most disruption among the 11 reasonable alternatives. However, direct community impacts to the Town of Laguna Vista would be minimal as only currently platted but undeveloped lots within the South Padre Island Golf Club/Community would be impacted. In addition, the construction of a build alternative would not result in the removal or interruption of the existing roadways and would continue to provide access between communities on both sides of the proposed 2nd Access Project.

4.2.3 ROW Acquisition and Potential Displacements

This section describes the proposed ROW acquisition and potential displacement impacts for each of the build alternatives. Displacements were determined from project mapping and aerial photography with alignment overlays. Impacts were confirmed through field inspections in the project area.

The CCRMA would provide relocation advisory assistance to any person, business, or nonprofit organization displaced as a result of the acquisition of real property for public use. Acquisition of property would be carried out in accordance with the Uniform Relocation Assistance and Real Property Acquisition Polices Act (URARPAA) of 1970, as amended. Consistent with the USDOT policy, as mandated by the URARPAA, CCRMA would provide relocation resources (including any applicable special provisions or programs) to all displaced persons without discrimination. The available structures must also be open to persons regardless of race, color, religion, or nationality and be within the financial means of those individuals affected. All property owners from whom property is needed are entitled to receive just compensation for their land and property. Just compensation is based upon the fair market value of the property.

4.2.3.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in displacements of residences and businesses, it is not possible to quantify the number, extent or location of displacements until such time as the location and ROW requirements for these projects have been determined. Under the No-Build Alternative, no 2nd Access Project-related displacements would occur.

4.2.3.2 Build Alternatives

Table 4-3 summarizes the displacement impacts of each build alternative to existing buildings in the project area. Impacts are characterized as potentially displaced single-family residential buildings or commercial buildings. **Exhibit 4-2** shows the location of potential displacements for each alternative. To date, no advanced ROW acquisition has taken place.

Table 4-3: ROW Acquisition and Potential Displacements

Alternative	Proposed ROW (acres)	Single-Family Residential Buildings	Commercial Buildings	Total Displacements
No-Build	0.00	0	0	**0**
1	466.86	0	0	**0**
2	424.38	1	1	**2**
3	461.40	0	0	**0**
4	435.04	0	0	**0**
5	392.56	1	1	**2**
6	443.19	0	0	**0**
7	360.57	1	1	**2**
8	365.42	0	0	**0**
9	322.92	1	1	**2**
10	369.61	0	0	**0**
11	286.99	1	1	**2**

Source: HNTB 2009

Alternative 1 would require the largest amount of ROW (466.86 acres), and Alternative 11 would require the least amount of ROW (286.99 acres). As of April 2010, Alternatives 2, 5, 7, 9 and 11 would each result in one single-family residential displacement and one commercial building displacement; these two displacements represent the same displacements among each of these five alternatives. In other words, the same single-family residential building and commercial building would be displaced by Alternatives 2, 5, 7, 9, and 11.

As of December 2009, the potentially displaced single-family residential building was under construction and was not occupied. As of April 2010, the potentially displaced multi-tenant commercial building that would provide office and/or retail space for up to three business entities was newly constructed but not occupied. Therefore, it is unlikely that employment or tax revenue impacts related to retail sales would be realized with the potential displacement of an unoccupied commercial structure.

Adequate information is unavailable to determine if the potentially displaced single-family residential building or commercial building that would be affected by Alternatives 2, 5, 7, 9, and 11 would require any special relocation considerations. No coordination with local governments, organizations, groups, or individuals regarding the potential relocation impacts has occurred to date. No multi-family residential units, schools, public facilities, places of worship, or cemeteries would be displaced by any of the build alternatives. Comparable residential and commercial relocation options are provided in **Section 4.2.4**.

Alternatives 1, 4 and 8 could potentially impact the shrimp farm, but a displacement is not anticipated. Alternatives 8, 9, 10 and 11 could potentially impact a private recreational facility at The Shores, but a displacement is not anticipated. Alternatives 1, 3, 4, 6, 8, and 10 would not result in any displacements.

4.2.4 Available Housing and Commercial Property in the Area

4.2.4.1 Residential Housing

Within the study area, single-family building has been trending upward, with average value per unit levels exceeding the Cameron County average. High-density and multi-family housing development activity on South Padre Island is a much larger and more prevalent component of its overall housing stock. A number of important large scale projects are under construction

including the Sapphire South Padre and The Shores of South Padre Island. In Laguna Vista, the South Padre Island Golf Club/Community's residential sections can accommodate hundreds of new residential units. It is important to note that residential property values and prices on South Padre Island are generally higher than values and prices for residential properties on the mainland where potential displacements are located.

A survey of online real estate services for a large portion of the study area revealed an adequate supply of affordable housing available in the study area (as of September 2009). **Table 4-4** lists the number of units available (for sale and rental) in two zip codes located within the mainland portion of the study area in a variety of price ranges. The average home value in the 78566 zip code is $55,700, while the average in the 78578 zip code is $77,800. As depicted in **Table 4-4**, two homes were available for purchase at a cost of $40,000 or less, 12 were available for purchase at a cost of $40,000 to $60,000 and 25 were available for purchase at a cost of $75,000 and $100,000. The data suggest that sufficient vacancies exist to accommodate the residential relocation required by the proposed action.

Table 4-4: Available Housing in the Study Area

Price Range ($)	78578	78566
Single-Family and Condominium Homes (for sale)		
0 to 20,000	0	0
20,000 to 40,000	1	1
40,000 to 60,000	11	1
60,000 to 75,000	7	4
75,000 to 100,000	14	11
100,000 to 150,000	98	7
150,000 to 200,000	59	15
Housing for Rent		
0 to 500	0	0
500 to 700	0	0
700 to 1000	0	0
1,000 to 1,400	0	1
1,400 to 2,000	1	1
2,000 to 5,000	1	0
5,000 to 10,000	0	0

Source: Realtor.com 2009

4.2.4.2 Commercial Properties

Commercial properties on the mainland are generally concentrated adjacent to SH 100 in the City of Port Isabel and FM 510 in the Town of Laguna Vista. The majority of commercial development within the study area (only 1.1 percent of the total study area) is associated with tourism. While commercial vacancy rates are not available for the area, the availability of undeveloped land that can be utilized for building and development (39.7 percent of the study area) demonstrates the opportunity for displaced businesses to be relocated to new locations in the general area. In addition, improved access and mobility resulting from the proposed action would be an incentive to future development or redevelopment within the project area and beyond. Over the long term, the project area would benefit from the proposed action because of improved access and mobility. Due to the opportunities for business redevelopment and relocation in the area, re-employment opportunities for affected employees would likely occur in the vicinity of their current employment or at other similar business establishments. Assistance would also be available from both the public and private sectors for those who may need new employment. It is important to note that commercial property values and prices on South Padre

Island are generally higher than values and prices for commercial properties on the mainland where potential displacements are located.

4.2.5 Toll Road Considerations

4.2.5.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT – some of which could be tolled. However, due to the lack of detailed funding plans and other pertinent details, toll-related impacts of these projects cannot currently be assessed. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts associated with tolling.

4.2.5.2 Build Alternatives

Non-Toll Facilities
For all Build Alternatives, access to the tolled causeway would be limited to those who pay the toll. As an alternative, the existing Queen Isabella Memorial Causeway would remain a non-tolled facility and would continue to provide access between the mainland and South Padre Island.

CCRMA Toll Policy Development
CCRMA is a newly-established tolling authority with one active toll road (SH 550). Policies established and adopted, to date, are available online at the CCRMA website (http://cameroncountyrma.org/docs/ CCRMA Toll Policies.pdf). The CCRMA is committed to ensuring accessibility to all potential users; thus, official policies would include prepayment provisions to accommodate those individuals that do not have access to bank accounts, credit card accounts or credit.

The CCRMA intends to utilize TxTAG as its primary electronic toll tag; although, it would also recognize and allow the use of toll tags issued by other Texas toll entities. In addition, video tolling will be available (although the objective of the toll operations procedures and policies created by the CCRMA is to increase the percentage of toll road customers who establish toll tag accounts). Because tolling is new to Cameron County, it is expected that some time would be required for customers to adjust to the toll road operations, rules and regulations. During a period of time to be determined by CCRMA staff following the initiation of CCRMA toll collection operations, an incentive based, customer-friendly approach would be employed toward customers who use the road without paying toll charges. While it is understood that the objective of the CCRMA is to collect revenue and minimize toll violation abuse, CCRMA believes that a supportive approach toward customers who do not pay the toll initially would allow for a period of adjustment as customers begin using the new toll roads, and would ultimately lead to new toll customers for the CCRMA.

TxDOT would provide customer service to CCRMA customers and would support all operations related to customer toll tag account set-up, account maintenance and customer service. The cost to purchase an electronic toll tag has not yet been determined, but would be comparable to the cost of toll tags in other parts of the state.

Current toll policies include exemptions for two types of users;

(a) **Emergency and Military Vehicles**: In accordance with the provisions of Sec. 370.177, 362.901 and 541.201 of the Texas Transportation Code, CCRMA will create technical procedures to ensure that authorized emergency vehicles, as well as state and federal military vehicles, are exempt from paying tolls on the CCRMA toll road system.
(b) **Public Transportation Vehicles**: As authorized under the provisions of Sec. 370.177 of the Texas Transportation Code and to facilitate a multi-modal transportation system that ensures safe and efficient travel for all individuals in Cameron County, public transportation vehicles with a carrying capacity of 16 or more individuals that are owned and/or operated on behalf of the Brownsville Urban System shall be exempt from paying tolls on CCRMA toll facilities.

Additional policies are currently under development by the CCRMA. These policies would also establish toll rates applicable to high occupancy vehicles and motorcycles. At this time toll rates have not yet been set for these types of vehicles.

Toll Rate and Economic Impact of Tolls

Investment grade traffic and revenue studies for the proposed 2nd Access Project have not been completed; thus, toll rates for the facility have not yet been established. However, it is anticipated that the toll rate would be between $0.15 and $0.20 per mile. In the absence of a stated preference and cost-sensitivity survey for the project, potential impacts from the proposed 2nd Access Project tolled bridge can be illustrated using the following scenario.

For a worst case analysis, it is assumed that the toll rate would be set at $0.20 per mile (when averaged over the length of the Laguna Madre crossing – the portion of the project proposed for tolling) and that the average user would make 250 round-trips per year (based on 50 five-day work weeks per year with two weeks of time off). The length of the tolled bay crossing ranges from approximately 7.4 miles (Alternatives 10 and 11) to 8.3 miles (Alternative 3). Under this scenario, the annual cost to use the tolled 2nd Access facility would range from $740.00 to $830.00 per year. A user with an annual household income equal to the 2007 median household income of Cameron County ($28,036) would spend approximately 2.6 to 2.9 percent of their annual household income on the proposed 2nd Access Project tolls. This is slightly lower than what households with incomes at the 2012 poverty level (i.e. $23,050 for a family of four) would spend; approximately 3.2 to 3.6 percent of their annual household income on tolls.

Tolling Technology

As proposed, bay crossing tolls would be collected electronically and cash toll booths would not be available on-site. Toll lane users would be required to obtain a toll tag and maintain a toll account or utilize pay-by-mail (video billing) options. The cost to purchase the toll tag has not yet been determined. A toll tag is an electronic sticker that goes on the inside of a driver's windshield, usually placed behind the rearview mirror. Electronic toll collection facilities read an electronic signal from a microchip inside the sticker and automatically deduct the correct amount from the toll tag account. Toll accounts would be pre-paid and could be maintained by bank account draft, credit card or cash deposit. Toll tag accounts could be set up by going online or by calling or visiting a customer service center. To off-set the additional cost of administering a video billing system, the video billing rate would be higher than the prepaid toll tag rate. TxDOT currently charges an additional 33 percent over the cash rate for video billing. The video billing system utilizes cameras mounted above the toll lanes to record the license plate of any vehicle without a toll tag and a bill is then mailed to the owner of the vehicle. Video billing includes a

one dollar service fee that is charged with every monthly billing cycle, regardless of the amount of use, in order to offset the costs related to processing license plate information.

CCRMA's toll policies include prepayment provisions to accommodate those individuals that do not have access to bank accounts or credit cards. Various methods of pre-payment for tolls could be available, including a pay-by-cash option for persons who do not have bank accounts to purchase new or to reload a depleted toll tag. Although, as currently proposed, an electronic toll collection is planned, the proposed 2nd Access facility would be designed to accommodate the possible addition of cash payment options such as toll booths or toll stations. These cash payment options, if installed, would provide an on-site payment option. However, the decision to install cash payment options would be determined based on demand for an on-site cash option once the roadway is operational. Tolling revenue collected from this project would go toward the cost of the roadway (repayment of bonds/debt), and would also be used for future maintenance and improvements for the roadway. Excess revenue would be used to fund other CCRMA projects.

Efforts are underway statewide to establish interoperable toll accounts. Once fully implemented, a single electronic toll collection account established by motorists with their local toll authorities in Austin, Dallas, San Antonio, Houston, Cameron County or elsewhere would provide access to toll roads through the use of a toll tag or sticker in any area of the state. To achieve interoperability, toll tags or stickers issued by the toll authority in one area of the state would be read by the toll systems in other areas of the state. The toll would then be deducted from the user's "home" account. CCRMA is committed to working with TxDOT to ensure the toll collection technology employed on the proposed 2nd Access Project would be compatible with the statewide effort.

Travel Time Comparison

Motorists from the north that choose to use the non-tolled alternative may experience longer travel times due to an increased distance to the non-tolled access to South Padre Island. The roads leading to the Queen Isabella Memorial Causeway currently experience seasonal peak period congestion with stop and go traffic conditions starting at the intersection of SH 48 and SH 100 and extending to the causeway. Congestion is most frequently experienced during tourist season (spring break, summer and holiday weekends) and is a function of tourist traffic moving on and off the island.

Officials from South Padre Island, Port Isabel and Laguna Vista were surveyed to determine approximate travel times between the SH 100/FM 510 intersection and South Padre Island under various scenarios (**Appendix B**). According to surveyed officials, the trip takes from 20 to 25 minutes during the tourist off-season. This increases to 25 to 40 minutes on summer weekdays and 35 to 45 minutes on summer weekends. Holiday weekends experience greater travel times with trips requiring 50 to 70 minutes. During evacuations, the trip is estimated to take an average of 60 to 120 minutes. Traffic accidents create delays of an additional 10 to 20 minutes on a typical day and can create delays up to 3 hours on holidays and other peak season weekends.

It is expected that construction of the tolled facility would improve mobility, public safety and provide congestion relief in the area that would decrease travel time from current conditions, especially during tourism seasons.

Potential Users of the Toll Facility

As an alternate route to the Queen Isabella Memorial Causeway, the proposed 2nd Access Project would present an alternate option for accessing South Padre Island. Many of the vehicle trips bound for South Padre Island that currently rely on the Queen Isabella Memorial Causeway include tourists, and residents from the area that live or work on South Padre Island. Although the proposed 2nd Access Project would be used extensively by tourists en route to and from South Padre Island, it is reasonable to assume the most frequent users would be persons living or working in the project area The second access would provide an alternate/more efficient route for some traffic, increase the labor pool "drawing area" (which includes Brownsville, Port Isabel, Laguna Vista, Laguna Heights and Harlingen) and shorten commute times to the northern end of the island.

The number of island-to-mainland and mainland-to-island work commuters was estimated using information from a report prepared by TXP, Inc. entitled *Proposed South Padre Island Second Access Project Economic Analysis* (**Appendix G**); additional information from the report's author, and information from a report prepared by THK Associates, Inc. entitled *Comprehensive Resort Market Analysis*[1] (**Appendix G**). Using information derived from these reports, it is estimated that 4,921 persons currently commute to work across the Queen Isabella Memorial Causeway, increasing to an estimated 6,171 during the summer tourist season. It is also estimated that by 2030, 8,282 persons will commute to work, increasing to 10,392 during the summer tourist season.

Preliminary traffic projections prepared for the proposed 2nd Access Project indicate that by 2030 approximately 48 percent of trips to and from the island would be made via the 2nd Access Project. By applying this projection to the estimates discussed above, it can be concluded that approximately 3,975 commuters, peaking to 4,988 commuters during the summer tourist season, would use the proposed 2nd Access. Assuming that each commuter makes one round trip daily, commute trips would represent approximately 7,950 – 9,976 daily trips across the 2nd Access Project.

4.2.6 Impacts to Traffic and Public Safety

4.2.6.1 No-Build Alternative

By not constructing the proposed 2nd Access Project, traffic congestion on and around the existing Queen Isabella Memorial Causeway would continue to worsen. As traffic congestion worsens, a corresponding increase in accidents and a reduction in safety would be anticipated.

Emergency service vehicles could experience increasing amounts of delay. Having a single point of access from the island restricts traffic flow during emergency evacuations, such as for hurricanes, and limits options for medical transport from the island to hospitals and health care facilities on the mainland. There are multiple concerns regarding the safety of having only one access route to the island. For example, a Category 2 hurricane threatening South Padre Island triggers a mandatory evacuation of the entire island. It is important that evacuation is done without delays or major incidents. During evacuation, gridlock occurs on the island and mainland as all outbound traffic is funneled across the existing causeway and onto SH 100 and other mainland roadways.

[1] Prepared for the Economic Development Corporation of the Town of South Padre Island

4.2.6.2 Build Alternatives

The proposed action would have an overall beneficial impact on the level of public safety in the study area. This improvement in public safety would be attributable to the diversion from the causeway of motorists who would use the proposed 2nd Access Project because of greater convenience and faster travel time. Similarly, any reduction in peak, weekday, weekend, and holiday local and non-local auto traffic on existing area roads would have beneficial public safety implications for the local area. Management of congestion on local roads could facilitate a reduction in response time for police, fire protection, and medical services.

Traffic demand is found to be the highest during the summer months and peaks during the spring break period. At such times, long delays are often realized by those crossing the Queen Isabella Memorial Causeway (refer to Chapter 1, Section 1.2.1.2 for more detailed discussion). Congestion during these times can be exacerbated by traffic accidents on the bridge or other incidents that could result in the incapacitation of the Causeway.

The limited access restricts traffic flow during emergency evacuations, limits the economic development potential of the area and contributes to elevated congestion levels and decreased mobility. The effects of these issues will be further compounded as the population of the island and the adjacent areas increase in the future. A second bridge to the island would allow for an alternate route to be taken. The proposed second access would provide for faster access to hospitals, doctors, and other emergency personnel, especially during times of high traffic.

4.2.7 Impacts to Travel Patterns and Accessibility

4.2.7.1 No-Build Alternative

Travel patterns within the project area would remain largely unchanged if the proposed action is not constructed. This would result in a continuation of travel delays and access constraints that currently characterize the project area. Under the No-Build Alternative, the insufficient transportation network within the project area would continue to pose mobility and access constraints; although, other projects of CCRMA, TxDOT and other entities would be constructed in the study area. The adverse effect of impaired mobility in the project area would continue to be felt mainly by residents, commercial establishments, and other interests in the form of increased commute time and other costs of congestion. The lack of accessibility negatively affects interests located for the most part outside of the study area. Additionally, the No-Build Alternative fails to address congestion and safety concerns.

4.2.7.2 Build Alternatives

The build alternatives offer improvements to travel patterns and accessibility within the study area to a large extent. As an alternate route to the Queen Isabella Memorial Causeway, the proposed 2nd Access Project would present an alternate option for accessing South Padre Island. Access to the island would be improved by all of the build alternatives. Many of the vehicle trips bound for South Padre Island that currently rely on the Queen Isabella Memorial Causeway would have a convenient alternative in the proposed 2nd Access Project, especially those trips that originate from the City of Harlingen and the towns or communities located to the north. Additionally, an alternative ingress and egress from the island would improve overall traffic circulation on the island and the mainland.

Each of the build alternatives utilizes existing roadways. The design provides for uninterrupted service on existing roadways. Finally, the proposed 2nd Access Project would improve access

for emergency vehicles responding to calls within the study area as well as improved access for emergency evacuations, such as hurricane evacuations.

4.2.8 Public Involvement

Extensive public involvement has been an integral part of the proposed action for the proposed 2nd Access Project process. The purpose of public involvement associated with the proposed 2nd Access Project has been to establish and maintain communication with the public and various affected or interested parties. These public activities included public scoping meetings, technical working group meetings, community workshops, and meetings with elected officials.

South Padre Island 2nd Access public scoping meetings were held on May 22, 2008, November 6, 2008 and February 6, 2009. The meetings provided information to the public and offered citizens and organizations the opportunity to speak with the South Padre Island 2nd Access study team. In addition, the meetings provided the project team the opportunity to listen to concerns of those who might be affected by the project. For more information about the public scoping meetings refer to **Chapter 8** and **Appendix J**.

Technical working groups were established for public involvement, economic development, engineering, context sensitive solutions and National Environmental Policy Act issues. For more information about the Technical Working Group meetings refer to **Chapter 8**.

Nine Context Sensitive Solutions Community Workshops for the proposed 2nd Access Project have been held for the purpose of giving participants a greater involvement in the proposed 2nd Access Project development process. The workshops began a dialog on what the citizens of the area wanted for the access project culturally, practically, and artistically, and engaged stakeholders in identifying community values and needs related to the proposed 2nd Access Project planning. The nine workshops were held in the communities of Port Isabel, Laguna Vista, and Padre Island. Each community held three meetings. For more specific information about these workshops refer to **Chapter 8**.

4.2.9 Limited English Proficiency Considerations

4.2.9.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would impact individuals with Limited English Proficiency, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts on individuals with Limited English Proficiency.

4.2.9.2 Build Alternatives

For the purposes of investigating impacts to Limited English Proficiency populations, census blocks groups adjacent to the 11 reasonable alternatives are used in the analysis. These adjacent census block groups comprise and will be referred to as the “project area.” The percentages of residents within the project area census block groups who speak English “not well” or “not at all” range from 2.8 percent (CT 123.02, BG 1) to 33.6 percent (CT 123.01, BG 3). Limited English Proficiency persons were identified within the census block groups in the project area. Alternatives 1-11 would all potentially impact four census block groups (CT 123.01, BG 2; CT 123.01, BG 3; CT 123.02, BG 1; and CT 123.03 BG 1), and Alternatives 2, 5, 7, 9 and 11

would impact the same four block groups as well as one additional block group (CT 123.01, BG 1). According to *Census 2000* data, of the residents who speak English "not well" or "not at all" located in the project area, the predominant language spoken is Spanish.

The CCRMA has ongoing public involvement and outreach efforts in place for its current projects, which includes the 2nd Access Project. The CCRMA, in partnership with TxDOT, has the primary responsibility for implementation of the 2nd Access Project. Efforts have been made to include all affected communities and populations, including potential minority and low-income populations, in the public involvement and decision making process (**Chapter 8**). Public outreach efforts have included public scoping meetings, technical working group meetings, community workshops, and meetings with elected officials. Future public outreach activities will include continued technical working group meetings and meetings with elected officials. A proactive public involvement program will continue for the proposed project and all populations affected will have a continuing opportunity to participate in the development of the project. Interpreters were present at the public scoping meetings and all project materials were available in Spanish. Spanish translation and interpretation will be available at the public hearings and will continue to be utilized in future meetings with Limited English Proficiency communities.

4.2.10 Impacts to Social Groups: Environmental Justice Considerations

4.2.10.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would impact environmental justice populations, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, current travel patterns to/from the island would remain unchanged; the environmental justice population (as well as the general population) would continue to use the existing causeway to access South Padre Island. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts on environmental justice populations.

4.2.10.2 Build Alternatives

The build alternatives of the proposed 2nd Access Project were evaluated for compliance with Executive Order 12898 and FHWA 6640.23. The census block groups associated with *Census 2000* located within or adjacent to the proposed ROW were used as the environmental justice analysis geographic unit to establish the area of potential effect for each build alternative and are referred to as the project area. The results of the analysis of minority data for each alternative at the census block level are shown in **Tables 4-5** through **4-15.** Minority populations for census block groups containing the affected census blocks are also provided in **Tables 4-5** through **4-15** for comparison purposes. This information identifies where these populations are located in proximity to each individual build alternative. The bolded areas of each table indicate those areas where the census block and comparison census block group percentages for racial and ethnic minorities exceed 50 percent. **Exhibits 4-3** through **4-13** illustrate each of the build alternatives and the adjacent census blocks.

Table 4-5: Census Blocks Affected by Alternative 1 – Minority Characteristics

Census Tract and Block Group	Census Block	Total Population	Percent Black or African American	Percent American Indian	Percent Asian-American	Percent Hispanic or Latino	Total Minority Percentage
Comparison Area Census Block Groups							
CT 123.01, BG 2	--	80	0.0	0.0	0.0	63.8	**63.8**
CT 123.01, BG 3	--	1,215	4.2	2.6	0.0	71.6	**78.4**
CT 123.02, BG 1	--	3,640	0.9	0.6	0.1	18.5	20.1
CT 123.03, BG 1	--	2,113	0.0	0.0	0.0	96.2	**96.2**
Alternative 1 – Project Area Census Blocks							
CT 123.01, BG 2	2001	6	0.0	0.0	0.0	83.3	**83.3**
CT 123.01, BG 2	2004	30	0.0	0.0	0.0	46.7	46.7
CT 123.01, BG 2	2012	4	0.0	0.0	0.0	100.0	**100.0**
CT 123.01, BG 3	3125	11	0.0	0.0	0.0	63.6	**63.6**
CT 123.02, BG 1	1011	72	0.0	0.0	0.0	23.6	23.6
Alternative 1 Project Area Total	-	123	0.0	0.0	0.0	37.9	37.9
The following census blocks adjacent to Alternative 1 contain no population: **CT 123.01:** 2003, 2005, 2008, 2009, 2010, 2016, 3084, 3085, 3086, 3087, 3088, 3121, 3122, 3123, 3124, 3998, 3999. **CT 123.02:** 1000, 1001, 1004, 1005, 1006, 1010, 1013, 1014, 1015, 1974, 1980, 1981, 1982, 1989, 1993. **CT 123.03:** 1010.							

Source: U.S. Census Bureau (USCB) 2000. Census2000 Summary File (SF 3) Sample Data.

Table 4-6: Census Blocks Affected by Alternative 2 – Minority Characteristics

Census Tract and Block Group	Census Block	Total Population	Percent Black or African American	Percent American Indian	Percent Asian-American	Percent Hispanic or Latino	Total Minority Percentage
Comparison Area Census Block Groups							
CT 123.01, BG 1	--	2,195	0.0	0.2	0.5	56.1	**56.8**
CT 123.01, BG 2	--	80	0.0	0.0	0.0	63.8	**63.8**
CT 123.01, BG 3	--	1,215	4.2	2.6	0.0	71.6	**78.4**
CT 123.02, BG 1	--	3,640	0.9	0.6	0.1	18.5	20.1
CT 123.03, BG 1	--	2,113	0.0	0.0	0.0	96.2	**96.2**
Alternative 2 – Project Area Census Blocks							
CT 123.01, BG 1	1030	31	0.0	0.0	0.0	54.8	**54.8**
CT 123.01, BG 2	2000	6	0.0	0.0	0.0	100.0	**100.0**
CT 123.01, BG 2	2001	6	0.0	0.0	0.0	83.3	**83.3**
CT 123.01, BG 3	3125	11	0.0	0.0	0.0	63.6	**63.6**
CT 123.02, BG 1	1011	72	0.0	0.0	0.0	23.6	23.6
Alternative 2 Project Area Total	-	126	0.0	0.0	0.0	41.0	41.0
The following census blocks adjacent to Alternative 2 contain no population: **CT 123.01:** 1031, 2010, 3085, 3086, 3 087, 3126, 3127, 3128, 3144, 3145, 3146, 3147, 3148, 3991, 3998, 3999. **CT 123.02:** 1000, 1001, 1004, 1005, 1006, 1010, 1013, 1014, 1015, 1974, 1980, 1982, 1989, 1993. **CT 123.03:** 1007.							

Source: USCB 2000. Census 2000 Summary File (SF 3) Sample Data.

Table 4-7: Census Blocks Affected by Alternative 3 – Minority Characteristics

Census Tract and Block Group	Census Block	Total Area Population	Percent Black or African American	Percent American Indian	Percent Asian-American	Percent Hispanic or Latino	Total Minority Percentage
Comparison Area Census Block Groups							
CT 123.01, BG 2	--	80	0.0	0.0	0.0	63.8	**63.8**
CT 123.01, BG 3	--	1,215	4.2	2.6	0.0	71.6	**78.4**
CT 123.02, BG 1	--	3,640	0.9	0.6	0.1	18.5	20.1
CT 123.03, BG 1	--	2,113	0.0	0.0	0.0	96.2	**96.2**
Alternative 3 – Project Area Census Blocks							
CT123.01, BG 2	2001	6	0.0	0.0	0.0	83.3	**83.3**
CT 123.01, BG 2	2004	30	0.0	0.0	0.0	46.7	46.7
CT 123.01, BG 2	2012	4	0.0	0.0	0.0	100.0	**100.0**
CT 123.01, BG 3	3125	11	0.0	0.0	0.0	63.6	**63.6**
CT 123.02, BG 1	1011	72	0.0	0.0	0.0	23.6	23.6
Alternative 3 Project Area Total	-	123	0.0	0.0	0.0	37.9	37.9
The following census blocks adjacent to Alternative 3 contain no population: **CT 123.01:** 2003, 2005, 2008, 2009, 2010, 2016, 3085, 3122, 3123, 3124, 3143, 3144, 3998, 3999. **CT 123.02:** 1000, 1001, 1004, 1005, 1006, 1010, 1013, 1014, 1015, 1974, 1980, 1981, 1982, 1989, 1993. **CT 123.03:** 1010.							

Source: USCB 2000. Census 2000 Summary File (SF 3) Sample Data.

Table 4-8: Census Blocks Affected by Alternative 4 – Minority Characteristics

Census Tract and Block Group	Census Block	Total Area Population	Percent Black or African American	Percent American Indian	Percent Asian-American	Percent Hispanic or Latino	Total Minority Percentage
Comparison Area Census Block Groups							
CT 123.01, BG 2	--	80	0.0	0.0	0.0	63.8	**63.8**
CT 123.01, BG 3	--	1,215	4.2	2.6	0.0	71.6	**78.4**
CT 123.02, BG 1	--	3,640	0.9	0.6	0.1	18.5	20.1
CT 123.03, BG 1	--	2,113	0.0	0.0	0.0	96.2	**96.2**
Alternative 4 – Project Area Census Blocks							
CT 123.01, BG 2	2001	6	0.0	0.0	0.0	83.3	**83.3**
CT 123.01, BG 2	2004	30	0.0	0.0	0.0	46.7	46.7
CT 123.01, BG 2	2012	4	0.0	0.0	0.0	100.0	**100.0**
CT 123.01, BG 3	3125	11	0.0	0.0	0.0	63.6	**63.6**
CT 123.02, BG 1	1011	72	0.0	0.0	0.0	23.6	23.6
Alternative 4 Project Area Total	-	123	0.0	0.0	0.0	37.9	37.9
The following census blocks adjacent to Alternative 4 contain no population: **CT 123.01:** 2003, 2005, 2008, 2009, 2010, 2016, 3084, 3085, 3086, 3087, 3088, 3121, 3122, 3123, 3124, 3998, 3999. **CT 123.02:** 1000, 1001, 1004, 1005, 1006, 1010, 1013, 1014, 1015, 1974, 1976, 1989, 1993. **CT 123.03:** 1010.							

Source: USCB 2000. Census 2000 Summary File (SF 3) Sample Data.

Table 4-9: Census Blocks Affected by Alternative 5 – Minority Characteristics

Census Tract and Block Group	Census Block	Total Area Population	Percent Black or African American	Percent American Indian	Percent Asian-American	Percent Hispanic or Latino	Total Minority Percentage
Comparison Area Census Block Groups							
CT 123.01, BG 1	--	2,195	0.0	0.2	0.5	56.1	**56.8**
CT 123.01, BG 2	--	80	0.0	0.0	0.0	63.8	**63.8**
CT 123.01, BG 3	--	1,215	4.2	2.6	0.0	71.6	**78.4**
CT 123.02, BG 1	--	3,640	0.9	0.6	0.1	18.5	20.1
CT 123.03, BG 1	--	2,113	0.0	0.0	0.0	96.2	**96.2**
Alternative 5 – Project Area Census Blocks							
CT 123.01, BG 1	1030	31	0.0	0.0	0.0	54.8	**54.8**
CT 123.01, BG 2	2000	6	0.0	0.0	0.0	100.0	**100.0**
CT 123.01, BG 2	2001	6	0.0	0.0	0.0	83.3	**83.3**
CT 123.01, BG 3	3125	11	0.0	0.0	0.0	63.6	**63.6**
CT 123.02, BG 1	1011	72	0.0	0.0	0.0	23.6	23.6
Alternative 5 Project Area Total	-	126	0.0	0.0	0.0	40.9	40.9
The following census blocks adjacent to Alternative 5 contain no population: **CT 123.01:** 1031, 2010, 2011, 3085, 3086, 3087, 3126, 3127, 3128, 3144, 3145, 3146, 3147, 3148, 3991, 3998, 3999. **CT 123.02:** 1000, 1001, 1004, 1005, 1006, 1010, 1013, 1014, 1015, 1974, 1976, 1989, 1993. **CT 123.03:** 1007.							

Source: USCB 2000. Census 2000 Summary File (SF 3) Sample Data.

Table 4-10: Census Blocks Affected by Alternative 6 – Minority Characteristics

Census Tract and Block Group	Census Block	Total Area Population	Percent Black or African American	Percent American Indian	Percent Asian-American	Percent Hispanic or Latino	Total Minority Percentage
Comparison Area Census Block Groups							
CT 123.01, BG 2	--	80	0.0	0.0	0.0	63.8	**63.8**
CT 123.01, BG 3	--	1,215	4.2	2.6	0.0	71.6	**78.4**
CT 123.02, BG 1	--	3,640	0.9	0.6	0.1	18.5	20.1
CT 123.03, BG 1	--	2,113	0.0	0.0	0.0	96.2	**96.2**
Alternative 6 – Project Area Census Blocks							
CT 123.01, BG 2	2001	6	0.0	0.0	0.0	83.3	**83.3**
CT 123.01, BG 2	2004	30	0.0	0.0	0.0	46.7	46.7
CT 123.01, BG 2	2012	4	0.0	0.0	0.0	100.0	**100.0**
CT 123.01, BG 3	3125	11	0.0	0.0	0.0	63.6	**63.6**
CT 123.02, BG 1	1011	72	0.0	0.0	0.0	23.6	23.6
Alternative 6 Project Area Total	-	123	0.0	0.0	0.0	37.9	37.9
The following census blocks adjacent to Alternative 6 contain no population: **CT 123.01:** 2003, 2005, 2008, 2009, 2010, 2012, 2016, 3085, 3122, 3123, 3124, 3126, 3127, 3128, 3130, 3131, 3132, 3998, 3999. **CT 123.02:** 1000, 1001, 1004, 1005, 1006, 1010, 1013, 1014, 1015, 1974, 1976, 1989, 1993. **CT 123.03:** 1010.							

Source: USCB 2000. Census 2000 Summary File (SF 3) Sample Data.

Table 4-11: Census Blocks Affected by Alternative 7 – Minority Characteristics

Census Tract and Block Group	Census Block	Total Area Population	Percent Black or African American	Percent American Indian	Percent Asian-American	Percent Hispanic or Latino	Total Minority Percentage
Comparison Area Census Block Groups							
CT 123.01, BG 1	--	2,195	0.0	0.2	0.5	56.1	**56.8**
CT 123.01, BG 2	--	80	0.0	0.0	0.0	63.8	**63.8**
CT 123.01, BG 3	--	1,215	4.2	2.6	0.0	71.6	**78.4**
CT 123.02, BG 1	--	3,640	0.9	0.6	0.1	18.5	20.1
CT 123.03, BG 1	--	2,113	0.0	0.0	0.0	96.2	**96.2**
Alternative 7 - Project Area Census Blocks							
CT 123.01, BG 1	1030	31	0.0	0.0	0.0	54.8	**54.8**
CT 123.01, BG 2	2000	6	0.0	0.0	0.0	100.0	**100.0**
CT 123.01, BG 2	2001	6	0.0	0.0	0.0	83.0	**83.0**
CT 123.01, BG 3	3125	11	0.0	0.0	0.0	63.6	**63.6**
CT 123.02, BG 1	1011	72	0.0	0.0	0.0	23.6	23.6
Alternative 7 Project Area Total	-	126	0.0	0.0	0.0	40.9	40.9
The following census blocks adjacent to Alternative 7 contain no population: **CT 123.01:** 1031, 2010, 2011, 3085, 3127, 3128, 3130, 3131, 3132, 3145, 3146, 3147, 3148, 3150, 3991, 3998, 3999. **CT 123.02:** 1000, 1001, 1004, 1005, 1006, 1010, 1013, 1014, 1015, 1974, 1976, 1989, 1993. **CT 123.03:** 1007.							

Source: USCB 2000. Census 2000 Summary File (SF 3) Sample Data.

Table 4-12: Census Blocks Affected by Alternative 8 – Minority Characteristics

Census Tract and Block Group	Census Block	Total Area Population	Percent Black or African American	Percent American Indian	Percent Asian-American	Percent Hispanic or Latino	Total Minority Percentage
Comparison Area Census Block Groups							
CT 123.01, BG 2	--	80	0.0	0.0	0.0	63.8	**63.8**
CT 123.01, BG 3	--	1,215	4.2	2.6	0.0	71.6	**78.4**
CT 123.02, BG 1	--	3,640	0.9	0.6	0.1	18.5	20.1
CT 123.03, BG 1	--	2,113	0.0	0.0	0.0	96.2	**96.2**
Alternative 8 - Project Area Census Blocks							
CT 123.01, BG 2	2001	6	0.0	0.0	0.0	83.0	**83.0**
CT 123.01, BG 2	2004	30	0.0	0.0	0.0	46.7	46.7
CT 123.01, BG 2	2012	4	0.0	0.0	0.0	100.0	**100.0**
CT 123.01, BG 3	3125	11	0.0	0.0	0.0	63.6	**63.6**
CT 123.02, BG 1	1011	72	0.0	0.0	0.0	23.6	23.6
Alternative 8 Project Area Total	-	123	0.0	0.0	0.0	37.9	37.9
The following census blocks adjacent to Alternative 8 contain no population: **CT 123.01:** 2003, 2005, 2008, 2009, 2010, 2016, 3084, 3085, 3086, 3087, 3088, 3122, 3123, 3124, 3178, 3998, 3999. **CT 123.02:** 1000, 1006, 1007, 1008, 1009, 1010, 1012, 1013, 1014, 1015, 1993. **CT 123.03:** 1010.							

Source: USCB 2000. Census 2000 Summary File (SF 3) Sample Data.

Table 4-13: Census Blocks Affected by Alternative 9 – Minority Characteristics

Census Tract and Block Group	Census Block	Total Area Population	Percent Black or African American	Percent American Indian	Percent Asian-American	Percent Hispanic or Latino	Total Minority Percentage
Comparison Area Census Block Groups							
CT 123.01, BG 1	--	2,195	0.0	0.2	0.5	56.1	**56.8**
CT 123.01, BG 2	--	80	0.0	0.0	0.0	63.8	**63.8**
CT 123.01, BG 3	--	1,215	4.2	2.6	0.0	71.6	**78.4**
CT 123.02, BG 1	--	3,640	0.9	0.6	0.1	18.5	20.1
CT 123.03, BG 1	--	2,113	0.0	0.0	0.0	96.2	**96.2**
Alternative 9 – Project Area Census Blocks							
CT 123.01, BG 1	1030	31	0.0	0.0	0.0	54.8	**54.8**
CT 123.01, BG 2	2000	6	0.0	0.0	0.0	100.0	**100.0**
CT 123.01, BG 2	2001	6	0.0	0.0	0.0	83.0	**83.0**
CT 123.01, BG 3	3125	11	0.0	0.0	0.0	63.6	**63.6**
CT 123.02, BG 1	1011	72	0.0	0.0	0.0	23.6	23.6
Alternative 9 Project Area Total	-	126	0.0	0.0	0.0	40.9	40.9
The following census blocks adjacent to Alternative 9 contain no population: **CT 123.01:** 1031, 2010, 2011, 3085, 3086, 3087, 3126, 3127, 3128, 3144, 3145, 3146, 3147, 3148, 3178, 3991, 3998, 3999. **CT 123.02:** 1000, 1006, 1007, 1008, 1009, 1010, 1012, 1013, 1014, 1015, 1993. **CT 123.03:** 1007.							

Source: USCB 2000. Census 2000 Summary File (SF 3) Sample Data.

Table 4-14: Census Blocks Affected by Alternative 10 – Minority Characteristics

Census Tract and Block Group	Census Block	Total Area Population	Percent Black or African American	Percent American Indian	Percent Asian-American	Percent Hispanic or Latino	Total Minority Percentage
Comparison Area Census Block Groups							
CT 123.01, BG 2	--	80	0.0	0.0	0.0	63.8	**63.8**
CT 123.01, BG 3	--	1,215	4.2	2.6	0.0	71.6	**78.4**
CT 123.02, BG 1	--	3,640	0.9	0.6	0.1	18.5	20.1
CT 123.03, BG 1	--	2,113	0.0	0.0	0.0	96.2	**96.2**
Alternative 10 – Project Area Census Blocks							
CT 123.01, BG 2	2001	6	0.0	0.0	0.0	83.3	**83.3**
CT 123.01, BG 2	2004	30	0.0	0.0	0.0	46.6	46.6
CT 123.01, BG 3	3125	11	0.0	0.0	0.0	63.6	**63.6**
CT 123.02, BG 1	1011	72	0.0	0.0	0.0	23.6	23.6
Alternative 10 Project Area Total	-	119	0.0	0.0	0.0	35.7	35.7
The following census blocks adjacent to Alternative 10 contain no population: **CT 123.01:** 2003, 2005, 2008, 2009, 2010, 2012, 2016, 3085, 3122, 3123, 3124, 3126, 3127, 3128, 3130, 3131, 3132, 3150, 3178, 3998, 3999. **CT 123.02:** 1000, 1006, 1007, 1008, 1009, 1010, 1012, 1013, 1014, 1015, 1993. **CT 123.03:** 1010.							

Source: USCB 2000. Census 2000 Summary File (SF 3) Sample Data.

Table 4-15: Census Blocks Affected by Alternative 11 – Minority Characteristics

Census Tract and Block Group	Census Block	Total Area Population	Percent Black or African American	Percent American Indian	Percent Asian-American	Percent Hispanic or Latino	Total Minority Percentage
Comparison Area Census Block Groups							
CT 123.01, BG 1	--	2,195	0.0	0.2	0.5	56.1	**56.8**
CT 123.01, BG 2	--	80	0.0	0.0	0.0	63.8	**63.8**
CT 123.01, BG 3	--	1,215	4.2	2.6	0.0	71.6	**78.4**
CT 123.02, BG 1	--	3,640	0.9	0.6	0.1	18.5	20.1
CT 123.03, BG 1	--	2,113	0.0	0.0	0.0	96.2	**96.2**
Alternative 11 – Project Area Census Blocks							
CT 123.01, BG 1	1030	31	0.0	0.0	0.0	54.8	**54.8**
CT 123.01, BG 2	2000	6	0.0	0.0	0.0	100.0	**100.0**
CT 123.01, BG 2	2001	6	0.0	0.0	0.0	83.3	**83.3**
CT 123.01, BG 3	3125	11	0.0	0.0	0.0	63.6	**63.6**
CT 123.02, BG 1	1011	72	0.0	0.0	0.0	23.6	23.6
Alternative 11 Project Area Total	-	126	0.0	0.0	0.0	40.9	40.9
The following census blocks adjacent to Alternative 11 contain no population: **CT 123.01:** 1031, 2010, 2011, 3085, 3126, 3127, 3128, 3130, 3131, 3132, 3145, 3146, 3147, 3148, 3178, 3991, 3998, 3999. **CT 123.02:** 1000, 1006, 1007, 1008, 1009, 1010, 1012, 1013, 1014, 1015, 1993. **CT 123.03:** 1007.							

Source: USCB 2000. Census 2000 Summary File (SF 3) Sample Data.

Tables 4-5 through **4-15** depict minority data for each build alternative at the census block and comparison census block group levels. Individual census block minority populations affected by the 11 alternatives range from 23.6 to 100.0 percent of total populations within those respective census blocks. Census Tract (CT) 123.02, Block Group (BG) 1, Census Block (CB) 1011 contains the lowest percentage of minority populations (approximately 23.6 percent), and CT 123.01, BG 2, CBs 2000 and 2012 contain the highest percentage (approximately 100.0 percent) of minority populations among affected census blocks. All alternatives, excluding Alternative 10, contain either CT 123.01, BG 2, CB 2000 or 2012. No alternatives include both CT 123.01, BG 2, CB 2000 and 2012. Minority populations in comparison census block groups, which contain the affected census blocks, range from 20.1 to 96.2 percent of census block group total populations. The Project Area totals for each alternatives ranged from 35.7 to 41.0 percent minority with Alternative 6 being one of the lowest, at 37.9 percent minority.

The results of the analysis of low-income data in the project area for each alternative at the census block group level are shown in **Tables 4-16** and **4-17**. Bolded areas in **Tables 4-16** and **4-17** indicate the census block groups where the median household income is below the 2012 DHHS poverty guideline ($23,050).

Table 4-16: Census Block Groups Affected by Alternatives 1, 3, 4, 6, 8 and 10 – Low-Income Characteristics

Census Tract/ Block Group	Alternatives	Population*	Median Household Income	Persons Below Poverty Level	
				Number	Percent
CT 123.01, BG 2	1, 3, 4, 6, 8, 10 and 11	93	$23,875	42	52.5
CT 123.01, BG 3	1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11	1,196	$43,125	258	37.6
CT 123.02, BG 1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11	3,640	$42,431	399	10.9
CT 123.03, BG 1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11	2,106	**$18,778**	986	46.7
Project Area Total	1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11	7,035	N/A	1,685	23.9

** Population for whom poverty status has been determined. Source: USCB 2000.Census 2000 Summary File (SF 3) Sample Data.*

Table 4-17: Census Block Groups Affected by Alternatives 2, 5, 7, 9 and 11 – Low-Income Characteristics

Census Tract/ Block Group	Alternatives	Population*	Median Household Income	Persons Below Poverty Level	
				Number	Percent
CT 123.01, BG 1	2, 5, 7, 9 and 11	2,208	$37,500	434	19.7
CT 123.01, BG 2	2, 5, 7, 9 and 11	93	$23,875	42	52.5
CT 123.01, BG 3	2, 5, 7, 9 and 11	1,196	$43,125	258	37.6
CT 123.02, BG 1	2, 5, 7, 9 and 11	3,640	$42,431	399	10.9
CT 123.03, BG 1	2, 5, 7, 9 and 11	2,106	**$18,778**	986	46.7
Project Area Total	2, 5, 7, 9 and 11	9,243	N/A	2,119	22.9

** Population for whom poverty status has been determined. Source: USCB 2000.Census 2000 Summary File (SF 3) Sample Data.*

Table 4-16 depicts the low-income characteristics of census block groups affected by Build Alternatives 1, 3, 4, 6, 8, and 10. These alternatives would potentially impact four block groups, including one block group (CT 123.03, BG 1) with a median household income below the 2012 Department of Health and Human Services (DHHS) poverty guideline ($23,050). These four block groups include a range of 42 to 986 persons (10.9 to 52.5 percent) living below the poverty level per block group.

Table 4-17 depicts the low-income characteristics of census block groups affected by Build Alternatives 2, 5, 7, 9 and 11. These alternatives would impact the same four block groups as Alternatives 1, 3, 4, 6, 8, and 10 plus one additional block group, for a total of five potentially impacted block groups. This includes the same block group (CT 123.03, BG 1) with a median household income below the 2012 DHHS poverty guideline ($23,050). These five block groups include a range of 42 to 986 persons (10.9 to 52.5 percent) living below the poverty level per block group. As discussed in **Section 4.2.3.2** and shown on **Exhibit 4-2**, Build Alternatives 2, 5, 7, 9 and 11 would each result in one single-family residential displacement and one commercial building displacement; these two displacements represent the same displacements among each of these five alternatives and are located within CT 123.01, BG 1.

Existing transportation and commuting characteristics within the environmental justice areas identified in the project area were obtained from *Census 2000*. These include the mode of transportation to work (for minority populations) and the travel time to work (for entire population) for individuals 16 years of age and older. These data were only available to the

census tract level; however, all of the block groups that comprise these two census tracts (CT 123.01, BG 1, BG 2 and BG 3; and CT 123.03, BG 1) are represented in the project area and contain environmental justice populations. The following shows the mode of transportation utilized by the minority population (age 16+) and the travel time to work for the entire population (age 16+) within both census tracts:

- CT 123.01 – 93.9% personal vehicle, 0.2% public transportation and 4.1% other (bicycle, walk). The remaining 1.8% work from home. Travel times are 0–14 minutes (30%), 15–29 minutes (43%), 30–44 minutes (22%) and 45+ minutes (5%).
- CT 123.03 – 79.7% personal vehicle, 2.9% public transportation and 12.3% other (bicycle, walk). The remaining 5.1% work from home. Travel times are 0–14 minutes (41%), 15–29 minutes (35%), 30–44 minutes (16%) and 45+ minutes (7%).

Extent of Adverse Impacts to Environmental Justice Populations

The impacts with the greatest relevance to the identified environmental justice census block groups are tolling, relocation/displacements, traffic noise impacts, visual intrusion, and transportation impacts.

Effects of Tolling on Environmental Justice Populations

The "Joint Guidance for Project Level Environmental Justice Toll Analysis" methodology for toll roads dated April 23, 2009, was used to evaluate the environmental justice impacts for tolling the project. Although the proposed 2nd Access Project would be used extensively by tourists en route to and from South Padre Island, it is reasonable to assume the most frequent users would be persons living or working in the project area and commuting to/from the island on a regular basis.

The number of island-to-mainland and mainland-to-island work commuters was estimated using information from a report prepared by TXP, Inc. entitled *Proposed South Padre Island Second Access Project Economic Analysis* (**Appendix G**); additional information from the report's author, and information from a report prepared by THK Associates, Inc. entitled *Comprehensive Resort Market Analysis*[2] (**Appendix G**). Using information derived from these reports, it is estimated that 4,921 persons currently commute to work across the Queen Isabella Memorial Causeway, increasing to an estimated 6,171 during the summer tourist season. It is also estimated that by 2030, 8,282 persons will commute to work, increasing to 10,392 during the summer tourist season.

Preliminary traffic projections prepared for the proposed 2nd Access Project indicate that by 2030 approximately 48 percent of trips to and from the island would be made via the 2nd Access Project. By applying this projection to the estimates discussed above, it can be concluded that approximately 3,975 commuters, peaking to 4,988 commuters during the summer tourist season, would use the proposed 2nd Access. Assuming that each commuter makes one round trip daily, commute trips would represent approximately 7,950 – 9,976 daily trips across the 2nd Access Project.

As previously stated, it would be daily commuters that would realize the greatest effect of tolling as these individuals would use the facility on the most regular basis. Based on *Census 2000* data (the best available data at the time this environmental impact statement was prepared), it is reasonable to assume that existing and future commuters would include individuals representing minority and/or low-income populations. However, because an origin and

[2] Prepared for the Economic Development Corporation of the Town of South Padre Island

destination study has not been conducted for the proposed project, it is not possible to accurately determine origin and destination points of island commuters. An origin and destination study would be prepared in conjunction with future project development activities.

As indicated in **Tables 4-5** through **4-15**, the total minority percentage for the 11 build alternatives ranges from approximately 35.7 to 41.0 percent minority of the project area total population. Four of five census block groups adjacent to the proposed project (CT 123.01, BG 1; CT 123.01, BG 2; CT 123.01, BG 3; and CT 123.03, BG 1) contain minority populations greater than 50 percent. In addition, one census block group (CT 123.03, BG 1) in the project area has a household income below the 2012 DHHS poverty threshold ($23,050); thus, this census block group is considered an environmental justice area based on median household income.

Non-Toll Facilities

Tolling of an isolated roadway would be expected to have the potential for adverse effects to environmental justice communities; however, the Queen Isabella Memorial Causeway would provide an effective non-toll option for motorists. Due to the existence of a non-toll alternative route (existing Queen Isabella Memorial Causeway) enhanced safety and mobility, facilitation of local and regional mobility, support of economic development, and the creation of an alternate evacuation route from South Padre Island, it is anticipated that there would be no disproportionate and adverse impacts to minority and low-income populations as a result of tolling the proposed project.

CCRMA Toll Policy Development

As stated in **Section 4.2.5.2**, CCRMA is a newly-established tolling authority with no active toll roads. As such, some of its policies are still under development. The CCRMA is committed to ensuring accessibility to all potential users; thus, it is anticipated that official policies would include prepayment provisions to accommodate those individuals that do not have access to bank accounts, credit card accounts, or credit. The cost to purchase an electronic toll tag has not yet been determined, but would be comparable to the cost of toll tags in other parts of the state. Therefore, the effects of the CCRMA toll policies are not expected to have a disproportionate adverse impact on environmental justice populations.

Toll Rate and Economic Impact of Tolls

As previously discussed, investment grade traffic and revenue studies for the proposed 2nd Access Project have not been completed; thus, toll rates for the facility have not yet been established. However, it is anticipated that the toll rate would be between $0.15 and $0.20 per mile. For a worst case analysis, it is assumed that the toll rate would be set at $0.20 per mile (when averaged over the length of the Laguna Madre crossing – the portion of the project proposed for tolling) and that the average user would make 250 round-trips per year (based on 50 five-day work weeks per year with two weeks of time off). The length of the tolled bay crossing ranges from approximately 7.4 miles (Alternatives 10 and 11) to 8.3 miles (Alternative 3). Under this scenario, the annual cost to use the tolled 2nd Access facility would range from $740.00 to $830.00 per year. Therefore, households with incomes at the 2012 poverty level (i.e. $23,050 for a family of four) would spend approximately 3.2 to 3.6 percent of their annual household income on tolls. As stated previously, a user with an annual household income equal to the 2007 median household income of Cameron County ($28,036) would spend approximately 2.6 to 2.9 percent of their annual household income on the proposed 2nd Access Project tolls, which is slightly lower than that of households with incomes at the 2012 poverty level.

Low-income households would spend a higher proportion of household income to use the proposed toll lanes when compared to the median household income of Cameron County. However, when considering the totality of the effects of this project, the overall benefits provided for the entire community, including the low-income population, outweigh the specific concerns about environmental justice that are discussed in this document. Benefits that would be realized by the entire community, including minority and low-income populations, include an overall improvement in public safety and local and regional mobility. The minority and low-income populations would gain greater access to hospitals, doctors and other emergency personnel, especially during times of high traffic. A second access between the mainland and island would allow for expedited evacuation and would not concentrate all evacuating traffic to one travel corridor in Port Isabel. Further, it should be noted that the Queen Isabella Memorial Causeway would remain non-tolled and in operation, continuing to provide non-tolled access to South Padre Island.

After considering the totality of the project effects, the benefits addressed above and the economic impacts (households with incomes at the 2012 DHHS poverty level estimated to absorb toll expenditures of approximately 3.2 to 3.6 percent of their annual household income), it is anticipated that there would be no project-level disproportionate and adverse impacts to minority and low-income populations as a result of tolling the bridge of the proposed project. In the event of a hurricane evacuation, all lanes of the toll bridge would be outbound from South Padre Island and tolls would be waived during the evacuation period.

Tolling Technology

As proposed, bay crossing tolls would be collected electronically; cash toll booths would not be available on-site. Toll lane users would be required to obtain a toll tag and maintain a toll account or utilize pay-by-mail (video billing) options, as discussed in **Section 4.2.5.2**. The cost to purchase the toll tag has not yet been determined. Toll accounts would be pre-paid and could be maintained by bank account draft, credit card or cash deposit. Additionally, toll accounts would include prepayment provisions to accommodate those individuals that do not have access to bank accounts or credit cards. Various methods of pre-payment for tolls could be available, including a pay-by-cash option for persons who do not have bank accounts to purchase new or to reload a depleted toll tag. In addition, the proposed 2nd Access facility would be designed to accommodate the possible addition of cash payment options such as toll booths or toll stations.

Efforts are underway statewide to establish interoperable toll accounts. Once fully implemented, a single electronic toll collection account established by motorists with their local toll authorities in Austin, Dallas, San Antonio, Houston, Cameron County or elsewhere would provide access to toll roads through the use a toll tag or sticker in any area of the state. CCRMA is committed to working with TxDOT to ensure the toll collection technology employed on the proposed 2nd Access Project would be compatible with the statewide effort.

The tolling technology proposed for the 2nd Access Project would not have a disproportionately high or adverse effect on environmental justice populations compared to non-environmental justice populations, because of the expected reasonably low limit for toll tag purchases and the interoperability of the TxDOT, CCRMA, and other toll authority operated toll roads throughout the state.

Travel Time Comparison

Although motorists from the north that choose not to use the tolled facility may experience longer travel times due to increase travel distance, the proposed 2nd Access Project would

benefit the adjacent environmental justice populations because of overall improvement in public safety and local and regional mobility. The roads leading to the Queen Isabella Memorial Causeway currently experience seasonal peak period congestion with stop and go traffic conditions starting at the intersection of SH 48 and SH 100 and extending to the causeway. Congestion is most frequently experienced during tourist season (spring break, summer and holiday weekends) and is a function of tourist traffic moving on and off the island. Since the entire region would realize enhanced safety, mobility and economic benefits, the environmental justice populations throughout the study area would benefit.

Potential Users of the Toll Facility

As an alternate route to the Queen Isabella Memorial Causeway, the proposed 2nd Access Project would present an alternate option for accessing South Padre Island. Many of the vehicle trips bound for South Padre Island that currently rely on the Queen Isabella Memorial Causeway would have a convenient alternative in the proposed 2nd Access Project, especially those trips that originate from the City of Harlingen and the towns or communities located to the north. Although the proposed 2nd Access Project would be used extensively by tourists en route to and from South Padre Island, it is reasonable to assume the most frequent users would be persons living or working in the project area.

Total avoidance of project impacts to the identified minority and low-income populations in the project area would not be possible within Cameron County, as the county is comprised predominantly of minority and low-income populations. Because the environmental justice populations are spread throughout the project area, tolling of the proposed 2nd Access Project would not have a disproportionate adverse impact on low-income or minority persons.

Effects of Property Acquisition and Business Relocations to Environmental Justice Populations

No schools, community or recreation centers, or places of worship, of any kind including those which may be considered especially important community and public resources to minority or low-income populations, would be displaced by any of the build alternatives (**Section 4.2.3**). Total avoidance of project impacts to the identified minority and low-income populations in the project area would not be possible within Cameron County, as the county is comprised predominantly of minority and low-income populations.

Effects of Increase in Traffic on Local Arterials and Collector Streets at New Access Road Locations to Environmental Justice Populations

The proposed action would have an overall beneficial impact by improving public safety, mobility and access in the project area. The build alternatives are expected to enhance safety and mobility, facilitate congestion management during peak travel periods and emergency evacuations and support economic development. There are no project related impacts from an increase in traffic on local arterials and collector streets to environmental justice populations. Total avoidance of project impacts to the identified minority and low-income populations in the project area would not be possible within Cameron County, as the county is comprised predominantly of minority and low-income populations.

Proximity Impacts, Such as Noise and Visual Intrusion, to Environmental Justice Populations

Noise levels are expected to increase along the build alternatives including those adjacent to environmental justice populations; however, no noise impacts (as defined in TxDOT's Noise Guidelines) are anticipated as a result of the proposed project. For additional information on traffic noise impacts, refer to **Section 4.3**. All of the build alternatives would cause visual

changes within either minority blocks or low-income groups. Total avoidance of project impacts to the identified minority and low-income populations in the project area would not be possible within Cameron County, as the county is comprised predominantly of minority and low-income populations.

Construction Impacts, Such as Noise and Additional Traffic, to Environmental Justice Populations

Impacts during construction, such as noise and visual changes, would be temporary and would not be expected to result in a disruption of normal activities or impacts for minority or low-income populations. Total avoidance of project impacts to the identified minority and low-income populations in the project area would not be possible within Cameron County, as the county is comprised predominantly of minority and low-income populations.

Title VI of the Civil Rights Act of 1964, as amended

Due to the demographic composition and spatial distribution of minority populations within the project area, the proposed action would have unavoidable impacts to minority populations regardless of which build alternative may be identified as the recommended preferred alternative. Therefore, the Title VI analysis suggests that it must be demonstrated that a legitimate, non-discriminatory purpose in implementing the proposed action would be achieved. The Title VI criteria would similarly require that the question of whether there is a reasonable, non-discriminatory alternative to the proposed action be addressed. The transportation planning, economic, and land use considerations that determined the location for the proposed action are manifest and have been discussed in **Chapter 1**. Alternatives that were considered during the process have been discussed in **Chapter 2**. There are well supported environmental and transportation planning considerations that demonstrate the reasonableness of the proposed action.

Mitigation and Compensation Options

FHWA Order 6640.23 states that the agency shall avoid disproportionately high and adverse impacts on minority and/or low-income populations by "…proposing measures to avoid, minimize, and/or mitigate disproportionately high and adverse environmental health effects and interrelated social and economic effects, and providing offsetting benefits and opportunities to enhance communities, neighborhoods, and individuals affected by FHWA programs, policies, and activities…" Due to the minority and low-income populations in the study area (**Tables 4-5 through 4-15**), consideration of mitigation options is warranted. As previously described, the principal impacts of the proposed action on these populations are expected to be relocation/displacements of businesses, tolling of low-income populations, and proximity impacts (i.e., noise and visual intrusion).

Total avoidance of project impacts to the identified minority and low-income populations in the project area would not be possible within Cameron County, as the county is comprised predominantly of minority and low-income populations. There are no undeveloped corridors that exist in the study area in which a facility meeting the project need and purpose could be constructed without similar impacts to other minority and/or low-income populations because Cameron County as a whole is comprised predominantly of minority populations. In addition, a location too far removed from the project area would not satisfy the need and purpose of the proposed action. Because there are no disproportionate and adverse impacts to minority and low-income populations as a result of the proposed project, no mitigation would be required.

Summary of Environmental Justice Considerations

The entire project area and the whole of Cameron County contain Environmental Justice populations, and the mobility and transportation benefits of the project cannot be accomplished without impacting these populations. While individual minority and low-income persons may be affected by the proposed project, it cannot be shown that the implementation of the proposed project would cause disproportionate adverse impacts to environmental justice populations. No disproportionately high or adverse human health or environmental effects specific to any minority or low-income group or individuals would be anticipated as a result of the implementation of the build alternatives or the No-Build Alternative. Any household or business that would be relocated or displaced would be eligible for assistance under the requirements of the Federal Uniform Relocation Act.

The cost of using the toll facility would require a greater proportion of household income of low-income users. However, this relatively minor fiscal impact would be off-set by the anticipated public safety, mobility and economic benefits of the proposed project.

Low-income and minorities, like the community as a whole, would benefit from the proposed project. These benefits include an overall improvement in public safety and local and regional mobility. The proposed project would provide an alternate access as well as east-west connectivity within the region by providing connections to FM 510, SH 100 and Park Road 100. The proposed project would also provide improved connectivity to the local road network. This would benefit local residents, including Environmental Justice populations, by enhancing access and mobility within the project area and surrounding neighborhoods. After construction, a reduction in peak season travel times and emergency response delays would be expected.

Using tolling as a funding source to provide accelerated project delivery for the proposed project would provide benefits. Timely implementation of the proposed project is key to providing safe and efficient emergency evacuation and improved emergency access; thus, minimizing the risk of loss of lives. Further, timely implementation is fundamental to achieving the mobility and economic development benefits of the proposed project; thus, improving quality of life in and around the project area.

After considering the totality of the project effects, it is anticipated that the proposed 2nd Access Project would not result in disproportionate impacts on minority and low-income populations within the project area due to the existence of a non-toll alternative route (Queen Isabella Memorial Causeway), benefits associated with enhanced safety and mobility, support of economic development, environmental sensitivity and the creation of an alternate evacuation route from South Padre Island. The proposed action is similarly consistent with Title VI in that there is no evidence of discriminatory intent or effect.

In summary, long term benefits to the entire community, including minority and low-income populations, include:

- Improved emergency evacuation;
- Greater access to hospitals, doctors and other emergency personnel, especially during times of high traffic;
- Enhanced east-west connectivity;
- Improved local and regional mobility for residents and commuters;
- Support for economic development; and
- Accelerated project delivery.

As described and analyzed in this document, the proposed project would not result in disproportionately high or adverse impacts to environmental justice populations; therefore, the proposed 2nd Access Project would be consistent with the policy established in Executive Order 12898 and FHWA Order 6640.23.

4.2.11 Impacts to Community or Public Resources

4.2.11.1 No-Build Alternative

The No-Build Alternative would adversely impact community and public resources within the proposed 2nd Access Project study area. The adverse impacts would be realized in the form of increased congestion, extended travel times and reduced mobility. The adverse travel effects could in turn impact tourism, emergency services, recreational facilities, and businesses as well as mobility and access within the study area.

4.2.11.2 Build Alternatives

Impacts to community and public resources may occur as a result of the proposed action. These impacts may include proximity impacts, such as traffic noise impacts, visual intrusion, or increased traffic on local arterials. Impacts may be more pronounced or less pronounced depending on the proximity of each resource to a proposed alternative. Although noise levels are expected to increase near all resources that are adjacent, or in close proximity to, one of the build alternatives, none of the identified community or public resources would be impacted by noise.

The impacts to community and public resources range from proximity impacts such as visual intrusion to increased traffic on adjacent streets. No schools, places of worship or community facilities would be relocated, or directly impacted, as a result of the proposed 2nd Access Project, as most of these facilities are located in the City of Port Isabel.

4.2.12 Economic Impacts

This section describes the economic impact of the proposed 2nd Access Project on the immediate region, defined by Cameron County. Economic activities that may be affected include employment, income, housing, and taxes. The primary impacts of the proposed action on the local economy are associated with improved access for increasing numbers of visitors to the island, increased tourism and visitor spending, increased residential development and increased tax revenues.

The construction and operation of any of the build alternatives would affect both employment and income within the region. In the short term, project construction would provide direct economic benefits to the region by increasing employment and earnings in the construction industry and through economic multiplier impacts, which would provide benefits to the broader economy as well. In addition, by facilitating access to local areas, any of the build alternatives may induce long-term growth in the region through an improved transportation infrastructure. Other long-term benefits would result from the operation and maintenance of any of the build alternatives.

When a construction project such as the proposed 2nd Access Project is undertaken there are direct expenditures which “trickle down” through the economy, producing a much larger effect than that simply resulting from the direct expenses. Economic impact analysis was performed through long-range economic and demographic forecast of Cameron County that includes key variables such as population growth, employment growth and distribution by sector, regional

income changes, real estate trends and other economic development issues that would influence growth over the coming decades.

The TXP, Inc. report presents an economic and demographic assessment of Cameron County and the proposed 2nd Access Project. TXP used a four-step methodology to assess the impact, resulting in three scenarios that reflect a range of possible outcomes: low (No-Build), medium (2nd Access build alternatives), and high (full CCRMA system map is implemented on the current timeline). For the purpose of this economic impacts analysis the No-Build (low) and build (medium) scenarios will be used. The full CCRMA system scenario is discussed in **Section 6.3.1**.

Information was collected from local, state, and federal agencies, including:

- Texas Workforce Commission
- Texas State Data Center
- Texas Comptroller of Public Accounts
- Texas Water Development Board
- USCB
- U.S. Department of Labor
- U.S. Bureau of Economic Analysis
- U.S. Postal Service
- Real Estate Center at Texas A&M University
- Brownsville Metropolitan Planning Organization
- Harlingen Metropolitan Planning Organization
- Cameron Appraisal District
- Reports and studies produced for cities within Cameron County

4.2.12.1 No-Build Alternative

The No-Build Alternative would not involve 2nd Access Project-related construction expenditures and as a result, 2nd Access Project-related benefits to employment and income would be experienced. Under the No-build alternative, the local and regional economies of the area are likely to continue growth trends described in **Chapter 3**. However, in the future, travel delay costs associated with the existing and anticipated congestion would be borne by roadway users and businesses that are dependent on the existing Queen Isabella Memorial Causeway. Negative economic impacts of the No-Build Alternative may include reductions in workplace productivity due to excessive congestion and higher per-mile costs for vehicles idling in traffic.

4.2.12.2 Build Alternatives

The construction of the proposed 2nd Access Project would create positive impacts on the regional and local economies. The following subsections summarize the estimated economic impacts associated with the build alternatives.

Regional Economic Impacts

As previously stated, an economic impact analysis was performed through long-range economic and demographic forecasting. Inflation, trade deficits, and credit market liquidity that ultimately have impact on local economic activity as well as implication of the ongoing national economic recession were all considered as factors in determining impacts to the region. Frequent trade with Mexico and the purchase of property in the study area by Mexican citizens was also considered when determining impacts. Two population and employment scenarios reflect a

range of possible outcomes: No-Build Alternative (Low scenario) and build alternatives (Medium Scenario). **Table 4-18** depicts the population forecast for specific census tracts located within the TXP, Inc. *Proposed South Padre Island Second Access Project Economic Analysis* report study area assuming the build alternative (Medium Scenario) is implemented. TXP, Inc. reviewed third-party forecasts of relevant economic and demographic variables as available including forecasts provided by the Texas State Data Center and Texas Water Development Board. In addition, TXP, Inc. incorporated population forecasts from individual cities from sources such as comprehensive plans, economic development documents, and other planning resources. TXP, Inc. developed a 30-year population and employment forecast using the most recent population and employment data as well as overall regional economic trends. This forecast assumes the entire CCRMA system map is implemented over the next 30 years, specifically, that the CCRMA completes the proposed 2nd Access by 2015 and constructs the Outer Parkway by 2030. The Outer Parkway, as currently envisioned, would be a controlled access, tolled, four-lane facility providing a new east-west travel route from U.S. 77, north of Harlingen, to FM 106 (General Brant Road) in the vicinity of FM 1847.

Table 4-18: Population Forecast in Specified Study Area Census Tracts in TXP, Inc. Economic Analysis Report Assuming Medium Scenario (Build Alternatives)

Census Tract	2008	2015	2030	2045
123.01	4,458	6,494	9,412	17,326
123.02	4,553	5,140	6,921	9,948
123.04	5,290	5,344	5,791	6,311

Source: TXP, Inc. 2009

Under the No-Build Alternative ("Low Scenario"), the City of South Padre Island's population would expand at 1.7 percent per year. This is below the 1990 to 2008 compound annual growth rate of three percent. This value is also less than the 2000 to 2008 compound annual growth rate of two percent. It is worth noting that the effects of Hurricane Dolly (2008) resulted in minimal growth during 2008. The area will experience slightly slower growth because of increased congestion on the existing Queen Isabella Memorial Causeway, longer commute times to reach the northern portion of the island, and a shrinking supply of available lots within the existing city limits (TXP, Inc. 2009).

Employment on South Padre Island fluctuates based on its tourism sector, which in turn is heavily dependent on the Texas economy since such a large number of visitors live within the state. According to data produced for the Office of the Governor, Economic Development Tourism Division, approximately 65 percent of visitors to the Brownsville-Harlingen Metropolitan Statistical Area are from Texas. In addition, 86 percent of visitors traveled by auto. A 2006 South Padre Island Visitor Tracking Survey found that roughly 70 percent of South Padre Island guests were from instate. During the past 10 to 15 years, South Padre Island employment has expanded 1.0 to 1.5 percent per year. For the No-Build Alternative (Low Scenario), it is projected that employment on the island will increase at a compound annual growth rate of 1.1 percent between 2010 and 2045 (TXP, Inc. 2009).

Within the study area, Port Isabel will experience modest population and employment growth under both a No-Build and build scenario. First, South Padre Island businesses employ nearly 1/3 of Port Isabel working residents. Even if the island's employment base rapidly expands, there is not excess labor supply in Port Isabel to meet the demand. Second, there is a general shortage of developable land available to support employment and population growth. While redevelopment opportunities exist, there are limits to how big the city can physically grow as a

result of the shortage of developable land. Therefore, the city does not have the physical capacity to meet all of the future shopping demands of tourists and island residents. Lastly, a substantial portion of Port Isabel retail sales are linked to tourists visiting the island (TXP, Inc. 2009).

The Laguna Vista area (Census Tract 123.01) will experience strong growth over the next few decades with or without a second access to South Padre Island. Real estate activity surrounding the South Padre Island Golf Club/Community should result in 1,000 acres of mixed-use development. In addition, the area is noticeably underserved when it comes to basic retail and service employment. This area should attract numerous new employers to provide basic services. Under the No-Build Alternative, however, this area experiences 17.5 percent less population and 17.8 percent less employment growth by 2045 (the 30 year projection after the assumed completion of the proposed 2nd Access in 2015) than the build scenario (TXP, Inc. 2009).

Impacts to Local Economies

The proposed 2nd Access Project has been developed with continuous direct input from local government officials, representatives from the business community, and local residents. Throughout the project development process, it has been recognized that the proposed 2nd Access Project would improve the local economy by encouraging economic development. The proposed 2nd Access Project build alternatives would stimulate the project area and region with improved access and visibility, creating new opportunities for development, jobs, and revenue to local tax bases.

Overall, the proposed project would result in positive economic impacts. Reduced congestion would help to accommodate additional visitors to the island who might be otherwise discouraged by traffic. Ease of access to the island would promote increased tourism, encourage more year-round residents to move to the island, and increase demand for goods and services as a result of increased tourism and increased residents. Additionally, construction of the proposed 2nd Access Project would have temporary economic benefits such as increased local employment during construction and economic benefit to local businesses utilized by construction-related personnel during construction.

Some negative aspects of the proposed 2nd Access Project can also be expected, for while the proposed 2nd Access is likely to facilitate an increase in local and regional transportation along its route, diversion of traffic flow from traditionally used routes (i.e., the Queen Isabella Memorial Causeway) could diminish local business exposure and revenue in and around the City of Port Isabel. In addition, all of the alternatives would subdivide agricultural fields and some alternatives may impact an existing shrimp farm, resulting in the possibility that these fields and the shrimp farm could become economically unproductive.

As previously discussed in **Section 4.1**, changes in land use would affect the local economy. Direct impacts occur when land acquired for ROW is removed from the tax rolls. ROW acquisition for the proposed 2nd Access Project would result in a one-time increase in income for property owners, benefiting the local economy, but would also cause a permanent loss of taxable values from the local tax rolls for land acquired for ROW. If businesses relocated to undeveloped land then there would be an increase to local tax rolls and benefit to the local economy. Travelers on the proposed tollway would add revenue and sales taxes to the local economy.

According to the economic impacts analysis, because the mainland and island landings are in close proximity, there is not a substantial difference when it comes to the regional population and employment impact. For example, all of the alternatives are sufficiently close to large parcels of developable land. Landowners might alter the specific development pattern or plans for their tracts (ex. varying density or mix of commercial/residential product) depending on the ultimate location selected. This in turn might affect the tax revenue implications of the area surrounding the access point landings, but not the overall population and employment forecast. There is a noticeable difference in overall economic development activity between the build and no-build scenarios.

Tables 4-19 and **4-20** contain the economic impact analysis for no-build and build alternatives' population and employment forecasts for the study area. The forecasting model utilized during the economic impacts analysis incorporates primary research, stakeholder input, public datasets, and third-party forecasts. In addition, results of the model were compared and adjusted based on existing studies, land use plans, and proposed developments.

Table 4-19: Study Area Population Forecast: 2008 - 2045

Scenario	2008	2015	2030	2045
No-Build Alternative	14,246	16,020	19,885	28,588
Build Alternative	14,246	16,157	22,197	32,002

Source: TXP, Inc. 2009

Table 4-20: Study Area Employment Forecast: 2008 - 2045

Scenario	2008	2015	2030	2045
No-Build Alternative	6,137	6,922	8,834	14,263
Build Alternative	6,137	7,037	9,836	16,307

Source: TXP, Inc. 2009

Tourism is the primary economic driver of the proposed 2nd Access Project study area. In 2008, the tourism sector accounted for approximately 3,300 direct jobs. This employment statistic, however, is down 700 jobs (20 percent) from the 2007 figure. The combination of Hurricane Dolly and the economic recession negatively impacted this sector. For example, total hotel room nights sold was down approximately 21.9 percent for the City of South Padre Island from 2007 to 2008. A similar trend was found in the City of Port Isabel with total hotel room nights sold down approximately 13.9 percent (TXP, Inc. 2009). **Table 4-21** summarizes the results of the tourism employment impact on Cameron County for the two scenarios analyzed in the economic impacts analysis. The figures shown in **Table 4-21** are the estimated and projected number of jobs in the tourism sector.

Table 4-21: Estimated Direct Study Area Tourism Employment

Scenario	2007	2008	2015	2030	2045
No-Build Alternative	4,080	3,222	4,725	3,832	6,436
Build Alternative	4,080	3,222	4,776	4,254	7,628

Source: TXP, Inc. 2009; Office of the Governor, Economic Development and Tourism

An economy can be measured in a number of ways. One of these is "Employment," which refers to permanent jobs that have been created in the local economy. **Table 4-22** contains the projected total economic impact of tourism within the study area for each scenario. The column

for employment represents the total number of jobs created in all sectors stemming from the creation of additional tourism economic development.

Table 4-22: Estimated Total Economic Impact of Study Area Tourism Activity in 2045

Scenario	Output ($ Millions)	Value Add ($ Millions)	Earnings ($ Millions)	Employment
No-Build Alternative	$751.1	$438.5	$249.6	10,948
Build Alternative	$890.1	$519.7	$295.8	12,975

Source: TXP, Inc. 2009; Office of the Governor, Economic Development and Tourism

The population, employment, and tourism projections for each scenario were then combined into a land use forecast. The economic impacts analysis applied population and employment ratios to the No-Build Alternative and build alternatives' population and employment projections. More information about the methodology used and specific ratios can be found in **Appendix G**. **Tables 4-23** and **4-24** summarize the results of the two scenarios analyzed in the economic impacts analysis in terms of residential and commercial land use.

Table 4-23: Study Area Residential Land Use Forecast (acres): 2008 - 2045

Scenario	2008	2015	2030	2045
No-Build Alternative	722.5	852	1120.5	1699.9
Build Alternative	722.5	858.8	1231.2	1929.5

Source: TXP, Inc. 2009

Table 4-24: Study Area Commercial Land Use Forecast (acres): 2008 - 2045

Scenario	2008	2015	2030	2045
No-Build Alternative	301.6	348.5	486.9	9443.9
Build Alternative	301.6	354.7	543.2	1032.1

Source: TXP, Inc. 2009

4.2.13 Summary of Impacts to Community Conditions

4.2.13.1 Town of Bayview

According to the Town of Bayview's Mayor, current traffic levels in the community already threaten the Town's goals of preserving itself as a quiet, rural residential community. The majority of Town of Bayview residents, according to the Mayor, also oppose commercial development within the community, including land along FM 510 through the Town. The Mayor states that the proposed connection of the 2nd Access to FM 510 would dramatically increase traffic flow through the community, and as a result, stimulate pressure for commercial development within the community as land values increase as a result of increases in visibility and access. According to the mayor, the increase in traffic flow would also jeopardize the rural and tranquil integrity of the community and work against its goals of preserving its serenity. By letter dated December 3, 2008, the Mayor specifically expressed opposition to those alternatives that would involve upgrading Center Line Road (Alternatives 1, 2, 4 and 6).

4.2.13.2 City of Port Isabel

According to the City of Port Isabel's City Manager, the lessening of congestion along SH 100 and the Queen Isabella Causeway as a result of a second access between the mainland and South Padre Island would allow the City of Port Isabel to become more of a unique destination community, which is ultimately the City's goal. Currently, congestion along SH 100 and the

Queen Isabella Causeway impedes the City of Port Isabel's ability to capture its potential of tourism revenue, especially from those wishing to specifically take advantage of the City of Port Isabel's historic, ecological, recreational, and cultural amenities. The City of Port Isabel's City Manager also stated that Port Isabel is currently a retail destination for many residents of South Padre Island, as many Island residents travel to the City of Port Isabel for basic needs such as groceries and general merchandise items. With less congestion, the City of Port Isabel's retail establishments would realize greater market capture because there would be less of an obstacle related to traffic congestion for Island residents to travel to the City. Therefore, the 2nd Access Project is anticipated to assist the City of Port Isabel in reaching its goals.

4.2.13.3 Town of Laguna Vista

According to the Town of Laguna Vista's City Manager and as mentioned in **Section 3.2.4**, the Town is currently in the process of transitioning from a general-law municipality to a home-rule municipality as designated in the Texas Local Government Code, which would ultimately give the Town more authority to control its boundaries, annex additional land area, implement community plans, enforce ordinances, and regulate land uses. In doing so, the Town of Laguna Vista plans to annex land north of its current municipal boundaries to encompass the area traversed by the proposed reasonable alternatives where they would tie into the mainland from crossing the Laguna Madre from South Padre Island. The plan to annex this land that would likely increase in value and development pressure would allow the Town of Laguna Vista to support additional development and expand its tax revenue to better serve Town residents and provide them additional community amenities. The proposed 2nd Access Project would allow the Town of Laguna Vista to advance this prominent goal and capitalize on such impacts.

4.2.13.4 City of South Padre Island

The proposed 2nd Access Project is integral to the City of South Padre Island's planning and development goals. The proposed project would allow the City of South Padre Island to attract additional year-round residents and tourists by improving mobility, increasing accessibility, and lessening congestion on the island and between the island and mainland. Such an enhancement working in conjunction with the City of South Padre Island's goal of annexing land north of the Town in unincorporated Cameron County would provide an opportunity for the Town to develop and support additional housing opportunities for year-round residents as well as tourist amenities to attract additional visitors. The 2nd Access Project would also contribute to providing a friendlier environment for residents, tourists, and businesses, allowing them improved access and mobility but also providing improved evacuation capacity from the island when warranted.

4.2.13.5 Laguna Heights

Because none of the 11 reasonable alternatives traverse the boundaries of the Laguna Heights census-designated place, the proposed 2nd Access Project is unlikely to have any substantial impact on the Laguna Heights community. An additional access bridge to South Padre Island would provide workers who live in Laguna Heights an alternative option for traveling to work on the island, and because the proposed 2nd Access to South Padre Island would likely shift some regional traffic away from using the Queen Isabella Causeway to the proposed facility, commute times may be reduced for those workers using the Queen Isabella Causeway with the anticipated overall improved mobility and accessibility and lessened congestion. It is unlikely, however, that many workers living in Laguna Heights and commuting to South Padre Island would use the proposed 2nd Access as a primary means to travel to work because the

alternative alignments would require commutes of longer distances from Laguna Heights to the island.

4.3 TRAFFIC NOISE IMPACTS

4.3.1 No-Build Alternative

The No-Build Alternative would not result in traffic noise impacts associated with the construction or operation of the proposed project.

4.3.2 Build Alternatives

A traffic noise analysis was conducted for the proposed 2nd Access Project. The analysis was accomplished in accordance with TxDOT's (FHWA approved) *Guidelines for Analysis and Abatement of Roadway Traffic Noise* (2011). The purpose of the analysis was to determine potential traffic noise impacts adjacent to the reasonable alternatives under consideration.

The FHWA traffic noise modeling software was used to calculate predicted traffic noise levels. The model primarily considers the number, type and speed of vehicles; highway alignment and grade; cuts, fills and natural berms; surrounding terrain features; and the location of activity areas likely to be impacted by the associated traffic noise. Predicted traffic noise levels were modeled at receiver locations that represent the land use activity areas adjacent to the 11 reasonable alternatives that might be impacted by traffic noise and potentially benefit from feasible and reasonable noise abatement. The existing noise conditions were measured in the field with a sound meter.

4.3.2.1 Description of Noise Receivers

All of the receivers located along the reasonable alternatives of the project represent outdoor human activity areas (backyards) facing the reasonable alternatives; therefore, they were analyzed as noise abatement criteria category B (exterior), with FHWA noise abatement criteria of 67 dBA (A weighted decibel value).

The following noise receivers were modeled along the roadway under noise abatement criteria category B (exterior with NAC level of 67 dBA): The Shores of South Padre pool (R1); Las Palmas Villas residential subdivision (R2); South Padre Island Golf Club/Community (a residential subdivision under construction) (R3); and an individual home (R4). Please refer to **Exhibit 4-14** for noise receiver locations.

Predicted noise levels for the design year 2036 were modeled for the reasonable alternatives. Traffic data for the design year (2036) is projected to be 28,550 vehicles per day.

The study area is mostly undeveloped (noise abatement criteria category G) within extraterritorial jurisdictions for which future land use plans are not available and no new development is currently planned, designed or programmed.

4.3.2.2 Impacts to Noise Receivers

Noise receivers adjacent to each alternative which could potentially be impacted were identified. The land adjacent to the reasonable alternatives is mostly undeveloped except at the intersections of Buena Vista Drive and FM 510. The intersection of Buena Vista Drive and FM 510 is developed for mostly commercial\industrial uses and one individual single-family home, represented by R4. This receiver, in addition to R1, R2 and R3 representing residential

subdivisions, were analyzed to determine potential traffic noise impacts. Results of the assessment are included in **Table 4-25**.

Table 4-25: Potential 2036 Traffic Noise Levels (dBA Leq)

Alternative	R1				R2				R3				R4			
	Existing	Predicted*	Change (+/-)	Noise Impact	Existing	Predicted*	Change (+/-)	Noise Impact	Existing	Predicted*	Change (+/-)	Noise Impact	Existing	Predicted*	Change (+/-)	Noise Impact
No-Build	44	46	+2	NO	52	54	+2	NO	51	53	+2	NO	44	46	+2	NO
1													44	53	+9	
2					52	53	+1		51	55	+4					
3													44	53	+9	
4													44	53	+9	
5					52	53	+1		51	55	+4					
6													44	53	+9	
7					52	53	+1		51	55	+4					
8	44	45	+1										44	53	+9	
9	44	45	+1		52	53	+1		51	55	+4					
10	44	45	+1										44	53	+9	
11	44	45	+1		52	53	+1		51	55	+4					

* Predicted noise levels for the No-Build Alternative were estimated based on a 74 percent increase in traffic for the entire roadway network (including roads other than SH 100 and the Queen Isabella memorial Causeway) by 2036 assuming that the existing conditions (i.e., roadway network) remain unchanged.
Source: HNTB 2009

As indicated in **Table 4-25**, none of the reasonable alternatives of the proposed 2nd Access Project would result in traffic noise impacts.

However, to avoid noise impacts that may result from future development of properties adjacent to the project, local officials responsible for land use control programs must ensure, to the maximum extent possible, no new activities are planned or constructed along or within the predicted (2036) noise impact contours, as shown in **Table 4-26**.

Table 4-26: Predicted 2036 Traffic Noise Impact Contours

Alternative/Undeveloped Area	Land Use	Contour	Distance from ROW in feet
1, 3, 4, 6, 8, 10/Between SH 100 and Center Line Road	NAC Category B & C	66	0
	NAC Category E	71	
2, 5, 7, 9, 11/Between SH 100 and Holly Beach Drive	NAC Category B & C	66	
	NAC Category E	71	

Source: HNTB 2009

Noise associated with the construction of the project is difficult to predict. Heavy machinery, the major source of noise in construction, is constantly moving in unpredictable patterns. However, construction normally occurs during daylight hours when occasional loud noises are more tolerable. None of the receivers is expected to be exposed to construction noise for a long duration; therefore, any extended disruption of normal activities is not expected. Provisions will be included in the plans and specifications that require the contractor to make every reasonable effort to minimize construction noise through abatement measures such as work-hour controls and proper maintenance of muffler systems.

A copy of this traffic noise analysis will be available to local officials. On the date of approval of this document (Date of Public Knowledge), FHWA and TxDOT are no longer responsible for providing noise abatement for new development adjacent to the project.

4.4 CLIMATE AND AIR QUALITY IMPACTS

4.4.1 No-Build Alternative

The No-Build Alternative would not conform to local transportation plans and programs. This alternative would be inconsistent with the *2007–2011 Cameron County Regional Mobility Authority Strategic Plan* (CCRMA 2006), which contains specific projects, programs, and policies intended to provide congestion relief, traffic safety, and enhance mobility in the rapidly growing Rio Grande Valley area. The No-Build Alternative would not meet the need to facilitate congestion management during peak travel periods and emergency evacuations.

4.4.2 Build Alternatives

Areas determined by the Environmental Protection Agency (EPA) to exceed a National Ambient Air Quality Standards (NAAQS) are designated as non-attainment areas. The NAAQS include: ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, lead, and particulate matter ($PM_{2.5}$ and PM_{10}). A State Implementation Plan (SIP) is a collection of requirements that delineates how a state would reduce emissions to attain the NAAQS. This SIP must be approved by EPA. For non-attainment areas, the 1990 Clean Air Act Amendments (CAAA) required the MPOs and

the state transportation departments to demonstrate that transportation plans, programs, and projects funded under Title 23 U.S. Code (U.S.C.) or the Federal Transit Act conform to state or federal implementation plans. Under the federal CAAA all transportation projects that are subject to FHWA approval must first be found to conform with the EPA approved SIP.

4.4.2.1 Criteria Pollutants

The proposed 2nd Access Project is located in Cameron County which is in attainment of all NAAQS; therefore, the transportation conformity rule does not apply. The proposed project is not located within an urbanized area or within the boundaries of a Metropolitan Planning Organization area; therefore, it is not included in a Metropolitan Transportation Plan. Because the project is currently unfunded and planned for letting beyond the current Statewide Transportation Improvement Program timeframe, the project is not currently included in the *2011–2014 Statewide Transportation Improvement Program*. However, it is anticipated that the proposed project would be included in a future Statewide Transportation Improvement Program.

However, the project is included in and consistent with the *2007–2011 Cameron County Regional Mobility Authority Strategic Plan* (CCRMA 2006). Refer to **Appendix C** for the *2007–2011 Cameron County Regional Mobility Authority Strategic Plan* page pertinent to the proposed project. In accordance with 40 Code of Federal Regulations (CFR) 93.114, FHWA will not take final action on this environmental document until the proposed project is consistent with a current Statewide Transportation Improvement Program.

Traffic data for the build alternatives design year (2036) is projected to be 28,550 vehicles per day. A prior TxDOT modeling study demonstrated that it is unlikely that a carbon monoxide standard would ever be exceeded as a result of any project with an average daily traffic below 140,000 vehicles per day. The average daily traffic projections for the build alternatives of the project would not exceed 140,000 vehicles per day; therefore, a Traffic Air Quality Analysis is not required.

4.4.2.2 MSAT

In addition to the criteria air pollutants for which there are NAAQS, the EPA also regulates air toxics. Most air toxics originate from man-made sources, including on-road mobile sources, non-road mobile sources (i.e., airplanes), area sources (i.e., dry cleaners) and stationary sources (i.e., factories or refineries).

In this document, a qualitative assessment has been provided relative to the reasonable alternatives of MSAT emissions and has acknowledged that the reasonable alternatives for the proposed project may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain, and because of this uncertainty, the health effects from these emissions cannot be estimated.

Project-Specific MSAT Information

A qualitative analysis provides a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives, found at:

http://www.fhwa.dot.gov/environment/air_quality/air_toxics/research_and_analysis/mobile_source_air_toxics/msatemissions.pdf

For each alternative in this document, the amount of MSAT emitted would be proportional to the vehicle miles traveled (VMT), assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for each of the build alternatives is slightly higher than that for the No-Build Alternative, because the additional capacity increases the efficiency of the roadway and attracts rerouted trips from elsewhere in the transportation network. This increase in VMT would lead to higher MSAT emissions for the recommended preferred build alternative along the highway corridor, along with a corresponding decrease in MSAT emissions along the parallel routes. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to EPA's MOBILE6.2 emissions model, emissions of all of the priority MSAT except for diesel particulate matter decrease as speed increases. The extent to which these speed-related emissions decreases would offset VMT-related emissions increases cannot be reliably projected due to the inherent deficiencies of technical models. Because the estimated VMT under each of the build alternatives are nearly the same, it is expected there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the build alternative chosen, emissions would likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by 72 percent between 1999 and 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

The additional travel lanes contemplated as part of the project build alternatives would have the effect of moving some traffic closer to nearby homes and businesses; therefore, under each alternative there may be localized areas where ambient concentrations of MSAT could be higher under certain build alternatives than the No-Build Alternative. However, the magnitude and the duration of these potential increases compared to the No-Build Alternative cannot be reliably quantified due to incomplete or unavailable information in forecasting project-specific MSAT health impacts. In sum, when a highway is constructed, the localized level of MSAT emissions for the build alternatives could be higher relative to the No-Build Alternative, but this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, MSAT would be lower in other locations when traffic shifts away from them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be lower in the future.

Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis
In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA,

http://www.epa.gov/ncea/iris/index.html). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's 2009 Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents, which can be found at the following address:

(http://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/100109guidmem.cfm).

This Appendix also discusses a variety of FHWA research initiatives related to air toxics. Among the adverse health effects linked to MSAT compounds at high exposures are cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI, http://pubs.healtheffects.org/view.php?id=282) or in the future as vehicle emissions substantially decrease (HEI, http://pubs.healtheffects.org/view.php?id=306).

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts - each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable. The results produced by the EPA's MOBILE6.2 model, the California EPA's Emfac2007 model, and the EPA's MOVES model in forecasting MSAT emissions are highly inconsistent. Indications from the development of the MOVES model are that MOBILE6.2 significantly underestimates diesel particulate matter (PM) emissions and significantly overestimates benzene emissions.

Regarding air dispersion modeling, an extensive evaluation of EPA's guideline CAL3QHC model was conducted in an NCHRP study (http://www.epa.gov/scram001/dispersion_alt.htm#hyroad), which documents poor model performance at ten sites across the country - three where intensive monitoring was conducted plus an additional seven with less intensive monitoring. The study indicates a bias of the CAL3QHC model to overestimate concentrations near highly congested intersections and underestimate concentrations near uncongested intersections. The consequence of this is a tendency to overstate the air quality benefits of mitigating congestion at intersections. Such poor model performance is less difficult to manage for demonstrating compliance with National Ambient Air Quality Standards for relatively short time frames than it is for forecasting individual exposure over an entire lifetime, especially given that some information needed for estimating 70-year lifetime exposure is unavailable. It is particularly difficult to reliably forecast MSAT exposure near roadways, and to determine the portion of time that people are actually exposed at a specific location.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI

(http://pubs.healtheffects.org/view.php?id=282). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA (http://www.epa.gov/risk/basicinformation.htm#g) and the HEI (http://wwwcf.fhwa.dot.gov/exit.cfm?link=http://pubs.healtheffects.org/getfile.php?u=395) have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine a "safe" or "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than safe or acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

Conclusion

In this document, a qualitative MSAT assessment has been provided relative to the various alternatives of MSAT emissions and has acknowledged that all of the project alternatives may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain, and because of this uncertainty, the health effects from these emissions cannot be estimated.

4.5 GEOLOGY AND SOILS IMPACTS

4.5.1 Impacts to Geologic Features

4.5.1.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. It is not possible to accurately assess the extent of geologic feature impacts that would result from these projects because route location and ROW requirements have not yet been established. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts on geologic features.

4.5.2.2 Build Alternatives

All build alternatives would traverse similar topography, soils and geologic features consisting of Beaumont Formation of Pleistocene age and the overlying sediments of Holocene age. Anticipated direct impacts from project construction would include cut and fill along the entire alternative. **Table 4-27** below identifies impacts to geologic features (defined in **Table 3-18 in Chapter 3**) for each alternative (**Exhibit 4-15**). Out of the six types within the study area, only four geological features would potentially be impacted by the reasonable alternatives.

Table 4-27: Impacts to Geologic Features

Alternative	Qac[1]	Qal[2]	Qas[3]	Qbr[4]	Total
No-Build	0.00	0.00	0.00	0.00	0.00
1	51.02	24.73	188.08	130.12	393.95
2	22.19	24.73	174.42	130.12	351.46
3	50.97	23.70	181.17	130.12	385.96
4	51.02	40.90	188.08	84.40	364.4
5	22.19	40.90	174.42	84.40	321.91
6	50.61	40.04	196.97	84.40	372.02
7	21.41	40.04	143.43	84.40	289.28
8	51.02	23.90	188.09	31.08	294.09
9	22.19	23.90	174.44	31.08	251.61
10	50.61	22.87	196.97	31.08	301.53
11	21.41	22.87	143.43	31.08	218.79

Source: University of Texas Bureau of Economic Geology 1992
[1] Alluvium in Rio Grande; Subdivided into Areas of Predominantly Clay
[2] Alluvium, Undivided
[3] Alluvium, Dominated by Silt and Sand
[4] Barrier Ridge and Barrier Flat Deposits

Construction of a roadway involves compaction of soils and removal of vegetation that can increase the amount of erosion and subsequent sedimentation. Slope, soil texture and precipitation during construction determine the soil loss potential. Erosion and sediment control measures would effectively minimize erosion and soil loss during construction. Long-term impacts to area soils can be reduced by implementing appropriate best management practices to minimize erosion during ancillary development.

To the maximum extent possible, where required, material excavated from the road cuts would be used as fill material. If suitable soils are not found within the ROW, they would be obtained from other sites within a reasonable haul distance of the project. Detailed investigations of soils for construction would be conducted during the final design phase of project development.

4.5.2 Energy Impacts

4.5.2.1 No-Build Alternative

The No-Build Alternative would not result in energy impacts associated with the construction or operation of the proposed project.

4.5.2.2 Build Alternatives

All build alternatives would require short-term energy consumption during construction activity. Construction-related energy consumption would be generally based on the construction cost of the alternative. The amount of energy required for the production and placement of materials (asphalt, structures, cut, fill, etc.) during construction would be a fixed one-time cost. Construction-related energy consumption would be short-term in nature and could be offset by operational energy efficiencies gained through the use of an improved transportation facility

over many decades. Energy impacts are a function of several variables including average running speed, vehicle-miles of travel and the mix of vehicle types in the system.

The designation of the proposed 2nd Access Project as a toll road is not expected to result in an adverse impact to energy resources. The proposed 2nd Access Project is expected to be an electronic toll collection facility. An electronic toll collection system provides operational efficiencies and would help reduce the stop-and-go conditions that are associated with conventional cash booths at toll plazas, resulting in lower consumption of energy resources. The toll designation would allow the roadway to be built sooner than with traditional funding; therefore, network construction would occur sooner. This would result in energy consumption reductions.

4.5.3 Impacts to Prime Farmland Soils

4.5.3.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would impact prime farmland soils, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined.

The No-Build Alternative would not result in 2nd Access Project-related impacts to prime farmland soils associated with the construction or operation of the proposed project. However, benefits of the No-Build Alternative (avoidance of these potential farmland impacts) would decrease over time as farmland and potential farmland is converted to residential and commercial uses.

4.5.3.2 Build Alternatives

Table 4-28 presents the direct impacts to prime farmland soils within the proposed ROW of each of the build alternatives.

Table 4-28: Prime Farmland Soils Impacts

Alternative	Prime Farmland Soils Impacts (acres)	Form CPA-106 Score
No-Build	0.00	n/a
1	59.09	52
2	5.10	27
3	20.73	42
4	59.09	49
5	5.10	26
6	2.72	47
7	0.07	27
8	59.09	50
9	5.10	26
10	2.72	38
11	0.07	26

Source: Natural Resources Conservation Service (NRCS) 2009

Prime farmland soils would be avoided, where practicable; however, each alternative would have an unavoidable effect on some prime farmland soils. The NRCS Form CPA-106 was used

to determine project-related impacts to farmlands in the study area. Farmland scoring on Form CPA-106 is based on a possible 260 points. Those alternatives (sites) receiving scores totaling less than 160 points are given a minimal level of consideration for protection. Alternatives 1–11 received scores between 26 and 52 points, below the criteria requiring further coordination with the NRCS. Copies of the forms are located in **Appendix F**. **Exhibit 4-16** identifies the general location of prime farmland soils within the build alternatives.

4.5.4 Impacts to Agricultural Operations

4.5.4.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would impact agricultural operations, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts on agricultural operations.

4.5.4.2 Build Alternatives

Segmentation of agricultural land by the build alternatives may constrain access to agricultural operations by farm equipment and livestock. Unavoidable segmentation of agricultural land would occur. Access would be restored to all affected properties, but in some instances travel across a formerly undivided parcel may be hampered. This may in turn disrupt the configuration of tracts relative to the operation of agricultural machinery and livestock fencing.

Bisection of farms or ranches could occur under the build alternatives. Where possible, the reasonable alternatives were aligned along existing property lines to avoid bisecting large tracts of land. Specific impacts to any potentially bisected farms will be studied in detail during the preparation of the final environmental impact statement. The recommended preferred alternative would be placed along and close to existing property lines, where possible, to minimize the splitting or fragmentation of farms. The proposed project would increase efficiency and accessibility to area roads. It is not anticipated that the build alternatives would have a substantial impact on the agricultural operations in the area.

4.6 WATER RESOURCES IMPACTS

The following sections describe the probable effects of the proposed project on the local and regional water resources.

4.6.1 Surface Water Impacts

4.6.1.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would impact water resources, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts on water resources.

4.6.1.2 Build Alternatives

All 11 build alternatives would cross four surface water features. These include a canal associated with the shrimp farm on the north side of the project area, a drainage ditch located south of the shrimp farm, another drainage ditch located south of FM 510, and the spillway from The City of Port Isabel Reservoir to the Laguna Vista Cove. Surface waters within the reasonable alternatives can be affected in numerous ways by the operations of a highway. Impacts to surface water quality in the land based alternatives would arise during construction activities. During construction, spills would be mainly limited to fuels (i.e., petrochemicals) and lubricants used for construction equipment. Construction in the immediate area of wetlands and waters can be assumed to generate additional sediment loads to the water bodies if bare earth is exposed for an extended period of time and not controlled using erosion control facilities. Impacts to the Laguna Madre from the water crossing alternatives would also include potential spills from construction equipment and sedimentation from the installation of the causeway support structures. During operation, the use of fertilizers, herbicides and/or pesticides could result in reduce water quality due to runoff.

Where and whenever necessary, feasible, and practical, the following best management practices would be incorporated at appropriate stages during construction. For erosion control, permanent vegetation (seeding mix) would be utilized for stabilization where necessary. For post-construction total suspended solids control, rock filter dams, a detention basin, or vegetative filter strips would be utilized. For sedimentation control, silt fencing would be utilized and remain in place until project completion. Outlet protection would be employed during construction and long-term maintenance and vegetative controls would be utilized in conjunction with roadway operations. In addition, preservation of natural areas would be performed to the maximum extent practicable.

4.6.2 Floodplain Impacts

4.6.2.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would impact floodplains, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related floodplain impacts.

4.6.2.2 Build Alternatives

The floodplain assessment compares the amount of floodplain encroachment anticipated by each build alternative and includes a discussion of the flooding risks, beneficial functions and values, and measures taken to avoid and minimize potential impacts.

Federal Insurance Rates Maps were obtained for Cameron County showing the regulatory base floodplains for the Laguna Madre and Gulf of Mexico. The 100-year floodplain was transferred onto the project mapping with geographic information systems. Geographic information system software was used to identify floodplains in the study area and quantify the extent of the 100-year floodplain encroachment associated with each build alternative (**Exhibit 4-17**). **Table 4-29** below shows the estimated floodplain encroachment for each build alternative.

Table 4-29: 100-Year Floodplain Impacts

Alternative	Floodplain (acres)
No-Build	0.00
1	346.30
2	359.25
3	279.82
4	314.48
5	327.44
6	236.48
7	282.15
8	244.84
9	257.79
10	162.86
11	208.69

Source: HNTB 2009

23 CFR 650.113 requires that encroachments on floodplains be the only practicable alternative, supported by the following information: 1. The reasons why the proposed action must be in the floodplain; 2. The alternatives considered and why they were not practicable; 3. A statement indicating whether the action conforms to applicable state or local floodplain protection standards.

The alternatives considered during the course of project development that would avoid encroachment on floodplains were the No-Build, Transportation System Management (**Section 2.3.4**), Travel Demand Management (**Section 2.3.5**) and Transit (**Section 2.3.2**). These were determined to be not practicable and would not meet the Need and Purpose of the project. Moreover, the proposed project would conform to state floodplain protection standards. The remaining practicable (build) alternatives would be designed to avoid impacts to floodplains to the maximum extent feasible and practicable. The build alternatives were quantitatively examined for encroachments on the study area's floodplains. Because South Padre Island is entirely within the 100-year floodplain, all build alternatives would encroach upon the 100-year floodplain of the Laguna Madre and the Gulf of Mexico.

Impacts to the 100-year floodplain would vary from approximately 162.86 acres as a result of Alternative 10 to approximately 359.25 acres as a result of Alternative 2. Alternative 6 would result in 236.48 acres of floodplain encroachment. Roadway encroachments on floodplains would be analyzed to determine any effects caused by the proposed facility should a 100-year flood occur. Inundation of the approaches, without causing significant damage to the approach roadway, is considered acceptable. The hydraulic design practices of this project would be in accordance with current TxDOT and FHWA design policies and standards. For these reasons, the proposed project is not anticipated to create a significant encroachment on any area floodplains as defined in 23 CFR 650.

Further avoidance and minimization of floodplain encroachments would be considered during preliminary and final design of the recommended preferred alternative. If it is determined during design, that the proposed project would result in an increase of more than 1 foot of the base flood elevation, a conditional letter of map revision and coordination with the Federal

Emergency Management Agency and the U.S. Army Corps of Engineers (USACE) would be required.

4.6.3 Groundwater Impacts

4.6.3.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would impact groundwater, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related groundwater impacts.

4.6.3.2 Build Alternatives

Construction, operation and maintenance of the proposed 2nd Access Project is not anticipated to adversely affect groundwater. The study area does not occur over any major or minor freshwater aquifers; therefore, the project would not have any potential impacts to any aquifer resources.

Impacts to Public Drinking Water Systems

The proposed project may increase infiltration rates and potentially increase pollution from the roadway runoff; however, it is anticipated to minimal. The proposed project is not anticipated to result in any effects on public drinking water systems. Potential impacts to public water supply wells were assessed using data gathered from the Texas Commission on Environmental Quality (TCEQ) and Texas Water Development Board databases. Well records indicated that eight public water supply wells are located within the study area, but none of the reasonable alternatives cross or would displace any of these wells. The proposed project is not anticipated to alter drinking water quality or quantity. The proposed project could potentially result in some redirection of surface water runoff; however, those impacts would be localized and minimal.

4.6.4 Wetlands and Other Waters of the U.S. Impacts

4.6.4.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in impacts to wetlands and other waters of the U.S., it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to wetlands and other waters of the U.S.

4.6.4.2 Build Alternatives

Construction activities associated with the proposed project would impact wetlands and aquatic systems to varying degrees. Land clearing during construction activities would remove vegetative cover and may increase surface runoff during storm events and could lead to erosion. If runoff is allowed to flow into water bodies without erosion and sediment control measures, increased turbidity and sedimentation may modify water chemistry due to elevated levels of sediments, nutrients and pollutants. Changes in water chemistry could diminish

suitable habitat for aquatic species, including littoral zone plants, and alter wetland functions and values.

Wetland functions and values are the processes wetlands perform and the measurements of the benefit these functions provide. Examples of wetland functions include nutrient cycling, flood-flow alteration, sediment stabilization and providing plant and animal habitat. The wetland values derived from these functions are measured in different ways, such as their ability to improve water quality, provide economic benefits for wetland-dependent businesses, help in stabilizing global levels of carbon dioxide, reduce flood damage and provide recreation opportunities (Texas Parks and Wildlife Department [TPWD] 2007h). Short-term impacts to wetland functions and values would most likely include temporary water quality degradation, wildlife habitat loss and a decrease in some recreational uses. Construction activities that fill wetlands would alter the ecological and hydrological values and functions of those wetlands. The clearing of vegetation and the filling of wetlands would result in a permanent loss of wetland wildlife habitat.

The National Agricultural Imagery Program 2008 1-meter aerial photographs from the Texas Natural Resources Information System, National Wetland Inventory (NWI) maps, published soil survey maps, and geographic information system data from the Texas General Land Office were used to determine the location and acreage of potential wetlands within each alternative. Although a delineation was not completed, a site visit was made to verify locations of resources. All potential wetland areas were delineated on these maps and transferred to an aerial background image managed with a geographic information system. **Exhibit 4-18** details the locations of potential wetlands within each alternative.

Alternatives were reviewed as required by Executive Order 11990 on wetlands, and no practicable alternatives to the proposed project were identified. **Table 4-30** provides a summary of the potential wetland impacts for all reasonable alternatives.

Table 4-30: Potential Wetland and Other Waters of the U.S. Within Reasonable Alternatives

Alt.	Freshwater Pond	Forested/ Shrub	Man-made[1]	Seagrass[2]	Freshwater	Saltmarsh	Mud Flats/ Salt Flats	Open Water	Total
No-Build	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.84	0.00	104.77	27.61	6.25	0.00	16.67	73.01	229.16
2	0.00	0.00	41.73	27.61	38.13	0.00	17.70	73.01	198.19
3	0.00	0.00	0.00	21.40	35.32	0.00	19.80	73.64	150.17
4	0.84	0.00	104.77	41.08	6.23	2.32	13.53	71.05	239.83
5	0.00	0.00	41.73	41.08	38.11	2.32	14.56	71.05	208.86
6	0.00	0.46	0.00	40.45	11.64	2.36	13.76	70.46	139.14
7	0.00	0.00	5.32	40.45	22.26	2.36	14.79	70.46	155.64
8	0.84	0.00	104.77	47.94	6.23	0.00	5.37	72.63	237.78
9	0.84	0.00	110.08	47.94	5.98	0.00	6.21	72.63	243.68
10	0.00	0.46	0.00	43.87	11.64	0.00	5.05	68.78	129.81
11	0.00	0.00	5.32	43.87	22.26	0.00	6.08	68.78	146.31

Note: All numbers are shown in acres
[1] Man-made water features - shrimp farm and man-made pond next to South Padre Island Golf Club/Community
[2] Seagrass data is from a survey performed by HNTB
Source: U.S. Fish and Wildlife Service (USFWS) NWI 2009m; HNTB 2009

As shown in **Table 4-30**, all 11 build alternatives would potentially result in impacts to wetlands. Potential impacts range from a minimum of 129.81 acres (Alternative 10) to a maximum of

243.68 acres (Alternative 9). Alternative 6 would impact 139.14 acres of wetlands. A detailed field survey will be performed to identify and delineate all of the wetlands and other waters of the U.S. within the ROW for the final environmental impact statement.

Permits

Section 404 of the Clean Water Act, which is administered and enforced by the USACE and EPA, requires a permit in order to discharge dredged or fill material into waters of the U.S., including wetlands. For impact greater than one-half acre (non-tidal) or one-third (tidal), the placement of temporary or permanent fill material into jurisdictional Waters of the U.S. would require authorization by a Section 404/10 Individual Permit.

Based on the preliminary assessment of wetland impacts, all 11 build alternatives would require a USACE permit under Section 404/10 and compensatory mitigation for unavoidable impacts. It is anticipated that a combination of individual and nationwide permits would be required. This project involves work in or over a navigable water of the U.S. under Section 9 of the Rivers and Harbors Act. This would require a U.S. Coast Guard (USCG) Section 9 Bridge Permit.

The USACE permit application would be requested under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899.

Following approval of the draft environmental impact statement and the public hearing, the final environmental impact statement and permitting process would begin. The recommended preferred alternative would be delineated for wetlands and other waters of the U.S. and the appropriate permit would be prepared and submitted to the USACE. The permit application would include a description of all proposed impacts to wetlands and waters of the U.S. within the proposed ROW and a proposed mitigation plan. The proposed project would affect more than 3 acres of waters of the U.S.; therefore, a TCEQ Tier II Section 401 Certification Questionnaire and Alternative Analysis Checklist would be required. A TCEQ Texas Pollution Discharge Elimination System (CWA Section 402) Construction General Permit would also be required.

The location of staging areas, borrow areas, placement areas, and other Project Specific Locations will be determined by the contractor; therefore, the contractor would be responsible for any required permitting and additional mitigation required for those areas.

4.6.5 Coastal Zone Management

4.6.5.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would occur within the coastal zone management area and coordination with the Coastal Coordination Council would be required, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related coastal zone impacts.

4.6.5.2 Build Alternatives

The Coastal Coordination Council is the agency responsible for planning and regulation of land and water uses in the Texas Coastal Zone, consistent with the Coastal Management Plan

(Texas Administrative Code, Title 31, Part 16, Chapter 501, Subchapter B Rule Section 501.12). Because the proposed project occurs within the coastal zone management area, coordination with the Coastal Coordination Council would be required.

A Federal Consistency Review would be conducted by the Texas General Land Office on behalf of the Coastal Coordination Council when construction occurs within the Texas Coastal Zone Boundary. The Texas General Land Office would review project plans to ensure that they meet the goals and policies of the Coastal Management Program to the maximum extent practicable. Project plans are submitted to the Texas General Land Office from the USACE.

4.7 ECOLOGICAL IMPACTS

4.7.1 Vegetation Impacts

4.7.1.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in impacts to vegetation, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to vegetation.

4.7.1.2 Build Alternatives

The primary impacts to vegetation resulting from site preparation and construction of the proposed project is the removal of existing vegetation from the ROW and any construction staging areas. Direct impacts to vegetation communities could entail the alteration of vegetation, soils and hydrology. Terrestrial vegetation may be mowed and/or removed in preparation for construction. Depending on construction needs, soils would be graded or amended with fill, and heavy equipment would compact soils, which often alters their characteristics. As the topography and vegetation are altered, hydrologic conditions associated with runoff and drainage flow would also change, although appropriate design measures would minimize these impacts. Unpaved disturbed areas within the ROW and staging areas would be revegetated. Best management practices would include, at a minimum, seeding or sodding of disturbed areas.

The construction of a new roadway affects the environment at various levels of geographic scale, from the microscopic to the landscape level. On a landscape level, the ecological communities currently existing within the project area would be fragmented to some degree. It is difficult to quantify this effect, primarily because there are numerous dynamic variables involved. Many generalizations regarding the concept of habitat fragmentation are well accepted, but specific processes and functional relationships are site specific, dynamic and interrelated at various scales of both time and space.

Habitat fragmentation is the disruption of large continuous blocks of habitat into smaller, less continuous habitats. The smaller habitat blocks support fewer individuals and the blocks can become isolated from adjacent blocks reducing the flow of genetic material throughout the population and between meta-populations. Habitat fragmentation is of greatest concern for wide-ranging animals, such as the ocelot, which possess relatively large home ranges.

Each of the reasonable alternatives for the proposed project would contribute to the fragmentation of habitats within the project area. However, the degree of habitat fragmentation differs among the reasonable alternatives. The general location and orientation of the alternatives contribute to the ecological significance of habitat fragmentation in the project area.

Alternatives 2, 5, 7, 9, and 11 are generally oriented north/south and follow the western edge of Laguna Vista. In addition, these alternatives utilize portions of the existing Holly Beach Road. Because of the proximity of these alternatives to Laguna Vista and the use of existing roadways, the effects of habitat fragmentation would be minimal.

Similarly, Alternatives 1, 4, and 8 utilize portions of Center Line Road and Buena Vista Drive, thereby minimizing habitat fragmentation by incorporating existing road ROWs. The dogleg of these alternatives in the northwest portion of the project area is aligned to avoid known ocelot habitats and thereby avoid additional fragmentation of ocelot habitat. The dogleg avoids habitat fragmentation by traversing cultivated lands to the south of Center Line Road minimizing fragmentation of remaining wildlife habitats.

Alternatives 3, 6 and 10 would result in the greatest habitat fragmentation as the alternatives traverse undisturbed ROW. These alternatives would fragment the block of habitat between Center Line Road and FM 510 into two smaller blocks. Once the alternatives intersect with Buena Vista Drive, they follow the existing Buena Vista ROW, thereby minimizing habitat fragmentation for the remaining portion of the alternative.

The direct impacts of construction, operation and maintenance of the new ROW add an element of disturbance to the ecosystem. The vegetation communities occurring along the build alternatives would be directly impacted by construction-related activities. The potential fragmentation of habitat and wildlife corridors and the potential modifications of hydrologic and nutrient cycling and transfer processes are also likely to have an impact on natural communities. Wetland and aquatic systems are impacted in a similar fashion through direct disturbance by heavy machinery compaction and scarification, the placement of fill and construction materials, and the disruption of hydrological and nutrient cycling. As with other elements of the ecosystem, wildlife communities are impacted by the permanent loss of habitat. In addition to direct construction-related mortality or injury, wildlife populations may suffer impacts associated with habitat fragmentation and displacement into adjacent habitats.

The build alternatives would potentially impact nine general vegetation community types: light brush, dense brush, rangeland, farmland, riparian, fence line, dune, seagrass and landscape. Two rare vegetation communities were also identified (black mangrove and seacoast bluestem-gulfdune paspalum). Although each of these communities would be potentially impacted, only wetlands, dunes, brush and farmland within the community types are regulated by state and federal resource agencies.

Vegetation community impacts were calculated using aerial photo interpretations within a geographic information system and are summarized in **Table 4-31**. The National Agricultural Imagery Program 2008 1-meter aerials were obtained from the Texas Natural Resource Information System and used to determine the vegetative community impacts. While vegetation communities occupy the vast majority of the ROW for each build alternative, portions of the ROW contain unvegetated areas. These areas are occupied by ponds, shrimp farms, existing roadway surfaces and structures. **Exhibit 4-19** details the location of vegetation communities within the project area.

Table 4-31: Vegetation Communities Within Reasonable Alternatives

Alternative	Black Mangrove	Seacoast Bluestem-Gulfdune Paspalum	Light Brush	Dense Brush	Rangeland	Farmland	Riparian	Fence Line	Dune	Seagrass[1]	Landscape	Total
No-Build	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	50.32	10.01	4.47	145.83	3.30	8.87	5.06	50.32	27.61	9.69	315.48
2	0.00	50.32	2.89	1.90	209.18	0.00	2.09	1.36	50.32	27.61	9.69	355.36
3	0.00	50.32	46.11	23.64	193.13	3.30	5.86	5.26	50.32	21.40	9.69	409.03
4	0.13	0.00	10.10	4.47	152.22	3.30	8.87	5.06	28.31	41.08	9.69	263.23
5	0.13	0.00	2.89	1.90	215.58	0.00	2.09	1.36	28.31	41.08	9.69	303.03
6	0.13	0.00	75.47	32.35	171.94	3.30	5.60	6.45	28.31	40.45	9.69	373.69
7	0.13	0.00	8.89	23.10	194.11	0.00	0.20	1.35	28.31	40.45	9.69	306.23
8	0.02	0.00	9.11	4.47	112.18	3.30	8.87	5.06	0.00	47.94	10.65	201.6
9	0.02	0.00	2.89	1.90	167.02	3.30	2.09	1.36	0.00	47.94	10.65	237.17
10	0.02	0.00	75.47	32.35	131.66	3.30	5.60	6.45	0.00	43.87	10.65	309.37
11	0.02	0.00	8.89	23.10	153.82	0.00	0.20	1.35	0.00	43.87	10.65	231.25

Note: All numbers are shown in acres
[1]Seagrass is also included as a wetland type in Section 4.6.4.2 and **Table 4-30**.
Source: HNTB 2009

Rare Vegetation Communities
The following S2 and S3 vegetation communities would be impacted by the build alternatives:

Black Mangrove Series (S2)
Black mangroves (*Avicennia germinans*) occur along the Laguna Madre shoreline of South Padre Island. Within the project area, sparse populations also occur along the mainland shoreline. The proposed project would impact less than 0.13 acre along the island shoreline. On the mainland side, only a few black mangrove plants would be impacted for Alternatives 1, 2, 3, 4, 5, 8 and 9. No black mangroves would be impacted on the mainland side for Alternatives 6, 7, 10 or 11.

Seacoast Bluestem-Gulfdune Paspalum Series (S3)
The Seacoast Bluestem (*Schizachyrium scoparium* var. *littorale*)-Gulfdune Paspalum (*Paspalum monostachyum*) vegetation community type occurs near the dunes on South Padre Island. Alternatives 1, 2, and 3 would each impact approximately 50.32 acres of this vegetation series while Alternatives 4, 5, 6, 7, 8, 9, 10, and 11 would not impact this series.

Texas Ebony-Anacua Series (S1)
The Texas Ebony (*Ebenopsis ebano*)-Anacua (*Ehretia anacua*) vegetation community occurs along moist river and resaca terraces within the Laguna Atascosa National Wildlife Refuge (LANWR). However, none of the build alternatives would impact this vegetation series.

Light Brush and Dense Brush
Thorn-scrub brush vegetation is present within the ROW of all build alternatives and has been separated into light brush and dense brush. Alternative 10 has the highest impact (approximately 119.34 acres) and Alternatives 2, 5, and 9 would have the least impact (approximately 4.79 acres). Alternative 6 would impact 107.82 acres of light and dense brush.

Rangeland
Rangeland is the dominant vegetation type within the project area. Alternative 5 would have the highest impact (approximately 215.58 acres) and Alternative 8 would have the least impact (approximately 112.18 acres). Alternative 6 would impact 171.94 acres of rangeland.

Farmland
Farmland represents a very small percentage of the total vegetation within the ROW of the build alternatives. Alternatives 2, 5, 7, and 11 would not impact farmland. The remaining alternatives would have approximately 3.30 acres of impact.

Riparian
Riparian vegetation represents a very small proportion of the total vegetation within the study area. Alternatives 1, 4, and 8 would have the highest impact (approximately 8.87 acres) and Alternatives 7 and 11 would have the least impact (approximately 0.20 acre). Alternative 6 would impact 5.60 acres of riparian vegetation.

Fence Line
Woody fence line vegetation comprises a relatively small percentage of the project area. Alternatives 6 and 10 would have the highest impact (approximately 6.45 acres) and Alternatives 7 and 11 would have the least impact (approximately 1.35 acres).

Dune

Dune vegetation is present along the bay and gulf sides of South Padre Island. Alternatives 1-7 impact a range of dune from approximately 28.31–50.32 acres. Alternative 6 would impact 28.31 acres of dune vegetation. Alternatives 8-11 would not impact any dune vegetation.

Seagrass

Direct impacts to the seagrasses would include the removal of plants during construction, and increased suspended sediments due to sediment disturbing activities. **Exhibit 4-19** details the location of seagrass beds within the project area. This analysis assumes the permanent removal of all seagrasses within the 80 foot easement crossing the Laguna Madre as a result of construction; thus, impacts reported herein would be worse case. Alternatives 8 and 9 would have the highest impact (approximately 47.94 acres) and Alternative 3 would have the least impact (approximately 21.40 acres). Alternative 6 would impact 40.45 acres. Additional seagrass bed acreage could be temporarily impacted during construction from dredging associated with construction barge access; however, a top down or stepped out construction method would largely eliminate these impacts. A summary of potential construction methods is discussed in **Chapter 2**. The following table (**Table 4-32**) summarizes the potential temporary impacts to seagrass from the four possible construction methods discussed in **Chapter 2**.

Table 4-32: Temporary Construction Impacts to Seagrass

Alternative	Parallel Dredging (160 feet) acres	Parallel Trestle (80 feet) acres	Parallel Sheet Piling/Haul Road (80 feet) acres	Top Down or Stepped Out Construction (20 feet) acres
1, 2	123.02	82.01	82.01	51.26
3	126.84	84.57	84.57	52.86
4, 5	121.96	81.28	81.28	50.75
6, 7	116.87	77.88	77.88	48.62
8, 9	128.32	85.52	85.52	53.42
10, 11	128.45	85.63	85.63	53.53

Source: HNTB 2012

Note: Temporary impacts determined using best available data at the time of draft environmental impact statement preparation. More refined construction methods and considerations will continue to develop through continued project coordination and permit coordination for the recommended preferred alternative following the public hearing and during preparation of the final environmental impact statement.

Any unmapped pipelines that might occur and which required relocation or removal could potentially entail disturbance of seagrass outside the 80 foot easement. These impacts would be included in proposed mitigation (**Section 7.6.4**).

Landscape

Landscaped vegetation represents a very small percentage of the total vegetation within the ROW of the build alternatives. Alternatives 1-7 would impact approximately 9.69 acres and Alternatives 8-11 would impact approximately 10.65 acres. Alternative 6 would impact 9.69 acres of landscaped vegetation.

Special Habitat Features

No bottomland hardwoods, caves, cliffs, bluffs, seeps, springs or snags were identified within the project area. Several man-made ponds are located in the shrimp farm along Alternatives 1, 4 and 8. In addition, a resaca meanders across Alternative 1, 4 and 8 before flowing into a channel along the south boundary of the shrimp farm, and emptying into the Laguna Madre near

the southeast corner of the shrimp farm. Alternative 6 would not impact any special habitat features.

4.7.3 Wildlife Impacts

4.7.3.1 Terrestrial Wildlife

No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in impacts to terrestrial wildlife, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to terrestrial wildlife.

Build Alternatives

Potential impacts to wildlife resulting from the proposed project can be attributed to the interaction/avoidance of wildlife with construction machinery, the loss of wildlife habitat (see **Table 4-31**), habitat fragmentation and wildlife/vehicle collision mortalities. These impacts would occur during construction of the proposed project and would potentially result in direct impacts to fish and wildlife resources in the project area. Additionally, some impacts including wildlife/vehicle collision would continue to occur, subsequent to construction of the proposed project.

Heavy machinery and other construction equipment may induce mortality of wildlife species that are slow moving, fossorial (adapted to burrowing and life underground), or those species that seek cover in debris and fallen vegetation. These include species of amphibians, gophers, lizards and snakes.

Wildlife populations adjacent to the project area would also be impacted by construction noise and activity that could stress adjacent wildlife or cause adjacent wildlife populations to seek refuge further away from the edge of the project area. Once completed, noise and traffic activity would continue to persist, albeit at a lower level. However, it is difficult to differentiate the effects of visual disturbance, habitat fragmentation or increased mortality due to the roadway from the effects of increased noise. Species that benefit from edge habitats and tolerate increased noise and visual disturbances would occupy habitats near the road or within the ROW upon completion of the proposed project. However, these species tend to be generalists and are not considered to be species that are declining. Overall, it is expected that wildlife diversity and composition would be altered as a result of the proposed project; however, no substantial long-term impacts to wildlife populations would result from increased noise and visual disturbances beyond the buffered area adjacent to the project ROW. Impacts due to habitat fragmentation may occur beyond the buffer area.

The primary impacts from the build alternatives to wildlife species inhabiting the project area are loss of habitat and habitat fragmentation and loss of connectivity between habitat patches. As shown in **Table 4-31**, Alternative 8 would result in the least amount of acreage impacts (187.63 acres) to wildlife habitat (brush, fence line, riparian and dune vegetation, rangeland and seagrasses) resulting in the least amount of adverse impacts to wildlife. Alternative 6 would result in the largest amount of impacts (360.57 acres) to wildlife habitat.

4.7.3.2 Colonial Waterbird Rookeries

No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in impacts to colonial waterbird rookeries, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to colonial waterbird rookeries.

Build Alternatives

The Texas Natural Diversity Database reports four occurrences of colonial waterbird rookeries (EO ID 5886, 8158, 3146 and 2057) within the study area. Dredged spoil sites related to the construction and maintenance of the Gulf Intracoastal Waterway provide artificial nesting habitats for colonial waterbirds. Three of these sites (Laguna Vista Spoil, Port Isabel Spoil and Three Island Spoil) have been identified in the study area by the Texas General Land Office as containing active colonial waterbird rookeries. None of these spoil sites or reported occurrences would be impacted by construction of any of the build alternatives; therefore, no direct impacts to colonial waterbird rookeries would occur as a result of the proposed project.

Rookeries could be temporarily impacted during construction. A summary of potential construction methods is discussed in **Chapter 2**. The following table (**Table 4-33**) summarizes the potential temporary impacts to rookeries from the four possible construction methods discussed in **Chapter 2**.

Table 4-33: Temporary Construction Impacts to Rookeries

Alternative	Parallel Dredging (160 ft) acres	Parallel Trestle (80 ft) acres	Parallel Sheet Piling/Haul Road (80 ft) acres	Top Down or Stepped Out Construction (20 ft) acres
1, 2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4, 5	0.00	0.00	0.00	0.00
6, 7	7.55	5.04	5.04	3.15
8, 9	11.53	7.68	7.68	4.80
10, 11	0.00	0.00	0.00	0.00

Source: HNTB 2012

Note: Temporary impacts determined using best available data at the time of draft environmental impact statement preparation. More refined construction methods and considerations will continue to develop through continued project coordination and permit coordination for the recommended preferred alternative following the public hearing and during preparation of the final environmental impact statement.

4.7.3.3 Migratory Bird Treaty Act

No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in impacts to migratory birds, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to migratory birds.

Build Alternatives

The 2nd Access Project would result in permanent vegetation loss within proposed ROW and safety clear zone, with associated loss of potential nesting habitat. The project could also result in alteration of the local migratory bird species community; studies have indicated that breeding activity and population size of certain avian species such as the eastern meadowlark (*Sturnella magna*) and horned lark (*Eremophila alpestris*) decrease as traffic (i.e., traffic noise) increases, while other species such as the red-winged blackbird (*Agelaius phoenicus*) increase (Forman 2002; Clark 1979). The Migratory Bird Treaty Act of 1918 makes it unlawful to kill, capture, collect, possess, buy, sell, trade or transport any migratory bird, nest or egg in part or in whole, without a federal permit issued in accordance with the Act's policies and regulations. Nesting surveys would be conducted to determine nesting activity prior to project construction. To avoid impacts to migratory birds, active breeding areas would be avoided during construction of the proposed project. The proposed bridge structure would provide swallow nesting habitat.

All 11 alternatives have the potential to impact migratory bird habitat within the project area. General habitats impacted include light and dense thornscrub brush, rangeland, farmland, riparian vegetation, fence line vegetation, dune grass vegetation, seagrass beds, wetlands and landscaped vegetation. Depending on the alternative, migratory bird habitat impacts range from 201.6 to 409.0 acres total, including 0.0 to 13.93 acres of Piping Plover habitat, 5.1 to 19.8 acres of mud and salt flats, 0.0 to 2.36 acres of salt marsh, 6.0 to 38.11 acres of freshwater wetland, and 4.8 to 107.92 acres of thorn-scrub brush. The primary habitat type impacted is rangeland; impacts from the build alternatives range from 112.2 to 215.6 acres. **Table 4-31** provides a summary of migratory bird habitat types, by alternative. No structural habitat (for example, bridge/culvert swallow nesting structure) would be impacted by any alternative.

4.7.3.4 Essential Fish Habitat

No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in impacts to essential fish habitat, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to essential fish habitat.

Build Alternatives

The Laguna Madre supports extremely valuable commercial and recreational fisheries. Potential impacts to essential fish habitat from activities associated with the construction, operation and maintenance of the proposed project may result from temporary degradation of water quality (sedimentation and turbidity) as well as direct impact from the installation of bridge supports and their foundations on the seafloor (loss of sandy bottom and seagrass habitat and the creation of water column structures). Other impacts that may result from the construction of the proposed project include effects from noise, mortality and displacement of fish and benthic organisms.

Many of the managed species are estuary dependent. It is because of this dependency that any coastal environmental degradation resulting from the proposed project would have the potential to adversely affect these species. The environmental deterioration and effects on these species would also result from any loss of coastal wetlands (seagrasses, mangroves and tidal flats), which function as primary nursery habitats for many of these managed species, and

from the functional impairment of existing habitat through decreased water quality. Potential impacts to marine organisms are most likely the result of impacts to the habitats of these managed species as well as to temporary lowered water quality due to suspended sediments.

The proposed construction and installation of the bridge support foundations would permanently disturb the seafloor, and thereby the benthic community, and would replace soft-bottom benthic habitats in the project area. Although the soft-bottom habitat would be lost, water column structures would be created that could potentially serve as an attractant to many fish species.

Water quality impacts of concern with regard to dredged or suspended material include increased turbidity, decreased dissolved oxygen levels, and the release of sediment-bound contaminants which ultimately could impact fish and benthic organisms and spawning, nursery and feeding areas. Turbidity would impact the water column through a decrease in water clarity potentially affecting foraging behavior of visual predators and filter feeders. In addition, turbidity would affect organisms that are dependent upon water clarity for photosynthesis, such as seagrasses. Other impacts to water quality could occur from the use of fertilizers, herbicides, and/or pesticides that could run off into the Laguna Madre.

All 11 alternatives have the potential to impact essential fish habitat within the project area. Depending on the alternative, seagrass impacts range from 4.78 to 15.63 acres, bridge pier impacts to habitat range from 0.54 to 0.64 acres, and channel dredging (construction phase) impacts to non-vegetated bottoms range from 17.64 to 31.25 acres.

An essential fish habitat assessment has been prepared in anticipation of consultation with NOAA Fisheries. Expanded essential fish habitat consultation as defined in (50 CFR 600.920(i)) may be utilized. Expanded consultations allow NOAA Fisheries and a federal action agency the maximum opportunity to work together in the review of an activity's impact on essential fish habitat and the development of essential fish habitat conservation recommendations. Expanded consultation procedures must be used for federal actions that would result in substantial adverse effects to essential fish habitat. Expanded consultation procedures provide additional time for the development of conservation recommendations, and may be appropriate for actions subject to preparation of an environmental impact statement.

Potential minimization measures include compliance with Federal regulations protecting essential fish habitat; project design intended to minimize essential fish habitat impacts. Top-down construction methods could be utilized for avoidance of impacts from construction access channel creation. Scour analysis and possible customized design of bridge piers could be used to minimize scouring and sediment transport impacts to essential fish habitat. Lastly, compensatory mitigation for direct impacts could be implemented by seagrass restoration at previously disturbed Laguna Madre locations.

4.7.4 Threatened and Endangered Species Impacts

4.7.4.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in impacts to threatened and endangered species, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to threatened and endangered species.

4.7.4.2 Build Alternatives

Chapter 3 provides a complete listing, status and habitat requirements of all federal and state listed threatened and endangered species that are known to occur within Cameron County. **Table 4-34** lists those species, as well as the potential for them to be impacted by the build alternatives. A check of the TPWD's "mimic" version of the Texas Natural Diversity Database was obtained on August 11, 2009 and on October 8, 2010. The Texas Natural Diversity Database did show occurrences for four federally-listed species (ocelot, jaguarundi, Piping Plover, green sea turtle) and seven state-listed species (Bailey's ballmoss, Lila de los llanos, sheep frog, black-spotted newt, south Texas siren, Mexican treefrog, peregrine falcon) within the study area, as well as occurrences of approximately 50 federal and state-listed species that have been documented within the vicinity of the study area. These occurrences are discussed in further detail in the following sections below. There have been no other recorded sightings of any federally- or state-listed species within close proximity of the study area. However, it should be noted that an absence of data for a particular species does not mean an absence of occurrence for threatened, endangered, and rare species.

Table 4-34: Potential Impacts to Rare, Threatened and Endangered Species

Scientific Name	Common Name	USFWS Status*	TPWD Status**	Potential Impacts
PLANTS				
Adelia vaseyi	Vasey's adelia	--		No impact
Ambrosia cheiranthifolia	South Texas ambrosia	E	E	May affect, not likely to adversely affect
Astrophytum asterias	Star cactus	--	E	No impact
Ayenia limitaris	Texas ayenia	E	E	May affect, not likely to adversely affect
Coryphantha macromeris var. *runyonii*	Runyon's cory cactus	--		No impact
Echeandia chandleri	Lila de los llanos	--		May impact
Echeandia texensis	Green Island echeandia	--		May impact
Grindelia oolepis	Plains gumweed	--		No impact
Heteranthera mexicana	Mexican mud-plantain	--		No impact
Justicia runyonii	Runyon's water-willow	--		May impact
Thelypodiopsis shinnersii	Shinner's rocket	--		May impact
Tillandsia baileyi	Bailey's ballmoss	--		May impact
AMPHIBIANS				
Hypopachus variolosus	Sheep frog	--	T	May impact
Leptodactylus fragilis	White-lipped frog	--	T	May impact
Notophthalmus meridionalis	Black-spotted newt	--	T	May impact
Siren sp. *1*	South Texas siren – large form	--	T	May impact
Smilisca baudinii	Mexican treefrog	--	T	May impact
BIRDS				
Aimophila botterii texana	Texas Botteri's Sparrow	--	T	May impact
Asturina nitida	Gray Hawk	--	T	May impact
Athene cunicularia hypugaea	Western Burrowing Owl			May impact
Buteo albicaudatus	White-tailed Hawk	--	T	May impact
Buteo albonotatus	Zone-tailed Hawk	--	T	No impact

Scientific Name	Common Name	USFWS Status*	TPWD Status**	Potential Impacts
Buteogallus anthracinus	Common Black-hawk	--	T	No impact
Camptostoma imberbe	Northern Beardless-tyrannulet	--	T	May impact
Charadrius alexandrinus	Snowy Plover	--		May impact
Charadrius alexandrinus nivosus	Western Snowy Plover	--		May impact
Charadrius alexandrinus tenuirostris	Southeastern Snowy Plover	--		May impact
Charadrius melodus	Piping Plover	T	T	May affect, likely to adversely affect
Egretta rufescens	Reddish Egret	--	T	May impact
Falco femoralis septentrionalis	Northern Aplomado Falcon	E	E	May affect, likely to adversely affect
Falco peregrinus anatum	American Peregrine Falcon	--	T	May impact
Falco peregrinus tundrius	Arctic Peregrine Falcon	--		May impact
Geothlypis trichas insperata	Brownsville Common Yellowthroat	--		May impact
Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	--	T	No impact
Icterus cucullatus sennetti	Sennett's Hooded Oriole	--		May impact
Icterus graduacauda audubonii	Audubon's Oriole	--		May impact
Mycteria americana	Wood Stork	--	T	May impact
Numenius borealis	Eskimo Curlew	--	E	May impact
Pachyramphus aglaiae	Rose-throated Becard	--	T	May impact
Parula pitiayumi	Tropical Parula	--	T	May impact
Pelecanus occidentalis	Brown Pelican	DM	E	May affect, likely to adversely affect
Plegadis chihi	White-faced Ibis	--	T	May impact
Sterna antillarum athalassos	Interior Least Tern	--	E	May impact
Sterna fuscata	Sooty Tern	--	T	May impact
INSECTS				
Agapema galbina	Tamaulipan agapema	--		May impact
Cicindela chlorocephala smythi	Smyth's tiger beetle	--		May impact
Cicindela nigrocoerulea subtropica	Subtropical blue-black tiger beetle	--		May impact
Sphingicampa blanchardi	A royal moth	--		May impact
Stallingsia maculosus	Manfreda giant-skipper	--		May impact
FISH				
Anguilla rostrata	American eel	--		May impact
Awaous banana	River goby	--	T	May impact
Ctenogobius claytonii	Mexican goby	--	T	May impact
Hybognathus amarus	Rio Grande silvery minnow	--	E	No impact
Microphis brachyurus	Opossum pipefish	--	T	May impact
Notropis jemezanus	Rio Grande shiner	--		No impact

Scientific Name	Common Name	USFWS Status*	TPWD Status**	Potential Impacts
Pristis pectinata	Smalltooth sawfish	--	E	May impact
MAMMALS				
Choeronycteris mexicana	Mexican long-tongued bat	--		May impact
Felis yaguarondi	Jaguarundi	E	E	May affect, likely to adversely affect
Lasiurus ega	Southern yellow bat	--	T	May impact
Leopardus pardalis	Ocelot	E	E	May affect, likely to adversely affect
Mormoops megalophylla	Ghost-faced bat	--		May impact
Nasua narica	White-nosed coati	--	T	No impact
Oryzomys couesi	Coues' rice rat	--	T	May impact
Panthera onca	Jaguar	--	E	No impact
Spilogale putorius interrupta	Plains spotted skunk	--		May impact
Trichechus manatus	West Indian manatee	E	E	May affect, not likely to adversely affect
REPTILES				
Caretta caretta	Loggerhead sea turtle	T	T	May affect, likely to adversely affect
Cemophora coccinea lineri	Texas scarlet snake	--	T	No impact
Chelonia mydas	Green sea turtle	T	T	May affect, likely to adversely affect
Coniophanes imperialis	Black-striped snake	--	T	May impact
Dermochelys coriacea	Leatherback sea turtle	E	E	May affect, not likely to adversely affect
Drymarchon corais	Indigo snake	--	T	May impact
Drymobius margaritiferus	Speckled racer	--	T	May impact
Eretmochelys imbricata	Hawksbill sea turtle	E	E	May affect, not likely to adversely affect
Gopherus berlandieri	Texas tortoise	--	T	May impact
Holbrookia propinqua	Keeled earless lizard	--		May impact
Lepidochelys kempii	Kemp's ridley sea turtle	E	E	May affect, likely to adversely affect
Leptodeira septentrionalis septentrionalis	Northern cat-eyed snake	--	T	May impact
Phrynosoma cornutum	Texas horned lizard	--	T	May impact
MOLLUSKS				
Popenaias popeii	Texas hornshell	C		No effect
Potamilus metnecktayi	Salina mucket	--		No impact
Quincuncina mitchelli	False spike mussel	--		No impact
Truncilla cognata	Mexican fawnsfoot mussel	--		No impact

*USFWS Listing Status – E – Endangered; T – Threatened; DM – Delisted Taxon, Recovered, Being Monitored First Five Years; C – Candidate for Listing; -- - not listed by the USFWS for El Paso County
**TPWD listing status – E – Endangered; T – Threatened; "blank" - Rare, but with no regulatory listing status
Source: TPWD July 16, 2009b; USFWS January 9, 2009i

Plant Species

Rare, threatened and endangered plant species would be directly impacted during ROW clearing activities. Due to the sedentary nature of plant species, the clearing of ROW would

result in the removal of the species from the proposed ROW area. Plant species used to revegetate the ROW would have the potential to out-compete the native threatened and endangered plant species. In addition, the disturbance of the soils during ROW preparation would increase the potential for invasive species, including non-native invasives, to become established in the project area further competing with native plant species.

Although the Texas Natural Diversity Database reports known populations of Vasey's adelia (EO ID 5594), Runyon's cory cactus (EO ID 5304), plains gumweed (EO ID 797) and Mexican mud-plantain (EO ID 7720) within 6 to 11 miles of the study area, soil conditions in the proposed ROW are not conducive for supporting populations of these species. Additionally, no gravelly clays or loams occur within the proposed ROW; therefore, there is no suitable habitat for the star cactus.

As stated in **Chapter 3**, suitable habitat for the remaining rare, threatened and endangered plant species occurs within the study area. **Table 4-35** lists the plant species that would be potentially impacted by the proposed 2nd Access Project.

Table 4-35: Rare, Threatened and Endangered Plants

Scientific Name	Common Name
Ambrosia cheiranthifolia	South Texas ambrosia
Ayenia limitaris	Texas ayenia
Echeandia chandleri	Lila de los llanos
Echeandia texensis	Green Island echeandia
Justicia runyonii	Runyon's water-willow
Thelypodiopsis shinnersii	Shinner's rocket
Tillandsia baileyi	Bailey's ballmoss

Source: TPWD July 16, 2009b; USFWS January 9, 2009i

Currently, the only populations of South Texas ambrosia are found in Kleberg and Nueces counties. The Texas Natural Diversity Database reports a population of South Texas ambrosia (EO ID 7388) approximately 13.4 miles west of the study area. Point Isabel clay loam soils (suitable habitat for South Texas ambrosia) occur along Alternatives 2, 5, 6, 7, 9, 10 and 11. Limited field surveys for South Texas ambrosia were conducted on October 1, 2009 after significant rainfall the previous week. No South Texas ambrosia populations were identified within the proposed ROW (where access was granted). Therefore, the proposed project may affect, but is not likely to adversely affect South Texas ambrosia.

The Texas Natural Diversity Database contains five known locations of Texas ayenia (EO ID 1992, 137, 1002, 3199, 7196) located from 7.4 miles to 11.4 miles west and southwest of the study area. All build alternatives cross soils similar to those where Texas ayenia is found, and which could potentially support this species. Therefore, the proposed project may affect, but is not likely to adversely affect, Texas ayenia.

The Texas Natural Diversity Database lists three known locations for Lila de los llanos (EO ID 2093), (EO ID 7046), and (EO ID 891) within the study area. OImito silty clay and Chargo silty clay soils that could support Lila de los llanos populations are crossed by all build alternatives; therefore, the proposed project may impact Lila de los llanos.

The Texas Natural Diversity Database contains two known locations of Green Island echeandia approximately 12.6 miles north (EO ID 4143) and 10 miles southwest (EO ID 4505) of the study area. All build alternatives cross Lomalta clay soils, which are saline clays. Therefore, the proposed project may impact Green Island echeandia.

The Texas Natural Diversity Database lists two known occurrences of Runyon's water-willow located approximately 10.6 miles northwest (EO ID 401) and 10.4 miles southwest (EO ID 105) of the study area. All build alternatives cross Lomalta clay and Olmito silty clay soils, which are calcareous soils that could support this species. Additionally, all build alternatives cross floodplains; therefore, the proposed project may impact Runyon's water-willow.

Clay soils located in Tamaulipan thorn-scrub vegetation occurs within the proposed ROW; therefore, the proposed project may impact Shinner's rocket.

The Texas Natural Diversity Database lists one known occurrence of Bailey's ballmoss (EO ID 7080) within the northern portion of the study area and another known occurrence (EO ID 3064) located approximately 4 miles west of the study area. Tamaulipan thorn-scrub and coastal grasslands occur within the proposed ROW; therefore, the proposed project may impact Bailey's ballmoss.

Amphibians

Amphibian species may be directly affected by displacement due to habitat conversion within the proposed ROW. Individuals in the project area may also experience harassment-effects (in the form of disturbance of normal behavior or activities) as a result of construction. These effects would be temporary; occurring only during the duration of construction. Due to the relatively small home ranges of the threatened and endangered amphibian species, the clearing of ROW could lead to the destruction of an individual's home range. Individuals occupying the proposed ROW would be pushed into adjacent habitats where they would be forced to compete with existing populations for food and cover resources. Due to the fossorial habits of most of the amphibians, the clearing of ROW and earth moving construction activities could lead to the mortality of individual amphibians.

Table 4-36 lists the amphibian species potentially impacted by project activities.

Table 4-36: Rare, Threatened and Endangered Amphibians

Scientific Name	Common Name
Hypopachus variolosus	Sheep frog
Leptodactylus fragilis	White-lipped frog
Notophthalmus meridionalis	Black-spotted newt
Siren sp. 1	South Texas siren – large form
Smilisca baudinii	Mexican tree frog

Source: TPWD July 16, 2009b; USFWS January 9, 2009i

The Texas Natural Diversity Database lists a known occurrence of the sheep frog (EO ID 8815) within the proposed ROW of Alternatives 1, 3, 4, 6, 8 and 10. Therefore, the proposed project may impact the sheep frog.

Suitable habitat for the White-lipped frog exists within the proposed ROW. Therefore, the proposed project may impact the White-lipped frog.

The Texas Natural Diversity Database lists two known occurrences of the black-spotted newt, one located within the northern portion of the study area (EO ID 6494) and one 3.8 miles southwest (EO ID 2616) of the study area. Therefore, the proposed project may impact the black-spotted newt.

The Texas Natural Diversity Database lists two known occurrences of the South Texas siren (EO ID 2018) and (EO ID 5392) within the study area. Therefore, the proposed project may impact the South Texas siren.

The Texas Natural Diversity Database lists a known occurrence of the Mexican treefrog (EO ID 8818) within the proposed ROW of Alternatives 1, 3, 4, 6, 8 and 10. Therefore, the proposed project may impact the Mexican treefrog.

Birds

Bird species may be directly affected by displacement due to habitat conversion within the proposed ROW. Individuals in the project area may also experience harassment-effects (in the form of disturbance of normal behavior or activities) as a result of construction; these effects would be temporary, occurring only during the duration of construction. Because of their mobility, direct mortality of bird species from project construction activity is unlikely to occur. However, the loss of nesting, foraging and cover habitats could impact the fecundity and survival of the bird species. Individuals occupying the proposed ROW would be pushed into adjacent habitats where they would be forced to compete with existing populations for food and cover resources.

No suitable habitat occurs within the study area for the Zone-tailed Hawk, Common Black-hawk or Cactus Ferruginous Pygmy-owl. Therefore, the proposed project would have no impact on these species.

As stated in **Chapter 3**, suitable habitat for the remaining rare, threatened and endangered bird species occurs within the project area.

Table 4-37 lists the bird species potentially impacted by project activities.

Table 4-37: Rare, Threatened and Endangered Birds

Scientific Name	Common Name
Aimophila botterii texana	Texas Botteri's Sparrow
Asturina nitida	Gray Hawk
Athene cunicularia hypugaea	Western Burrowing Owl
Buteo albicaudatus	White-tailed Hawk
Camptostoma imberbe	Northern Beardless-tyrannulet
Charadrius alexandrinus	Snowy Plover
Charadrius alexandrinus nivosus	Western Snowy Plover
Charadrius alexandrinus tenuirostris	Southeastern Snowy Plover
Charadrius melodus	Piping Plover
Egretta rufescens	Reddish Egret
Falco femoralis septentrionalis	Northern Aplomado Falcon
Falco peregrinus anatum	American Peregrine Falcon
Falco peregrinus tundrius	Arctic Peregrine Falcon
Geothlypis trichas insperata	Brownsville Common Yellowthroat
Icterus cucullatus sennetti	Sennett's Hooded Oriole
Icterus graduacauda audubonii	Audubon's Oriole
Mycteria Americana	Wood Stork
Numenius boreali	Eskimo Curlew
Pachyramphus aglaiae	Rose-throated Becard
Parula pitiayumi	Tropical Parula
Pelecanus occidentalis	Brown Pelican
Plegadis chihi	White-faced Ibis
Sterna antillarum athalassos	Interior Least Tern
Sterna fuscata	Sooty Tern

Source: TPWD July 16, 2009b; USFWS January 9, 2009i

Suitable habitat within the study area exists for the Gray Hawk, Western Burrowing Owl, Snowy Plover, Brownsville Common Yellowthroat, Sennett's Hooded Oriole, Eskimo Curlew, Tropical Parula, Northern Beardless-tyrannulet, and the Audubon's Oriole. Therefore, the proposed project may impact these species.

There is appropriate nesting and foraging habitat for the Texas Botteri's Sparrow and it is known to occur in the LANWR. Therefore, the proposed project may impact the Texas Botteri's Sparrow.

The Texas Natural Diversity Database lists a known occurrence of the White-tailed Hawk (EO ID 8274) approximately 7.7 miles south of the study area. In addition, a White-tailed Hawk was observed near the proposed ROW for Alternatives 3, 4, 5, 6, 7, 9 and 10 during site surveys. Therefore, the proposed project may impact the White-tailed Hawk.

The Piping Plover, including nesting pairs, is known to occur within the study area and designated critical habitat for the species is located on the bay and gulf sides of South Padre Island. Because the bridge landings on the islands would impact Piping Plover critical habitat, the proposed project may affect, and is likely to adversely affect this species. Alternatives 2 and 3 would have the highest amount of impact (13.93 acres) and Alternatives 8-11 would have no effect on Piping Plover critical habitat. Alternative 6 would impact 13.54 acres of Piping Plover critical habitat.

Additional Piping Plover critical habitat acreage could be temporarily impacted during construction. A summary of potential construction methods is discussed in **Chapter 2**. The following table (**Table 4-38**) summarizes the potential temporary impacts to Piping Plover critical habitat from the four possible construction methods discussed in **Chapter 2**.

Table 4-38: Temporary Construction Impacts to Piping Plover Habitat

Alternative	Parallel Dredging (160 ft) acres	Parallel Trestle (80 ft) acres	Parallel Sheet Piling/Haul Road (80 ft) acres	Top Down or Stepped Out Construction (20 ft) acres
1, 2	3.48	2.18	2.18	1.31
3	3.49	2.20	2.20	1.32
4, 5	3.83	2.43	2.43	1.46
6, 7	3.41	2.16	2.16	1.30
8, 9	0.00	0.00	0.00	0.00
10, 11	0.00	0.00	0.00	0.00

Source: HNTB 2012
Note: Temporary impacts determined using best available data at the time of draft environmental impact statement preparation. More refined construction methods and considerations will continue to develop through continued project coordination and permit coordination for the recommended preferred alternative following the public hearing and during preparation of the final environmental impact statement.

The Reddish Egret is a common inhabitant of the LANWR and was identified within the study area during field reconnaissance surveys in May 2008. Therefore, the proposed project may impact the Reddish Egret.

Efforts are underway to reintroduce the Northern Aplomado Falcon on the LANWR and South Texas. A nesting pair occurs within the project area and the Texas Natural Diversity Database lists a known occurrence (EO ID 5542) approximately 5.8 miles southwest of the study area. The species is known to occur on the refuge and within the study area. In addition, there is suitable nesting and foraging habitat for this species within the study area. Therefore, the proposed project may affect, and is likely to adversely affect the Northern Aplomado Falcon. Effects would be caused through displacement forced by the conversion of habitat to transportation uses, including aggravation due to construction activity. Alternative 6 would have the highest amount of habitat impacts (248.10 acres) and Alternative 7 would have the least impact (135.50 acres).

The Texas Natural Diversity Database lists known occurrences of the Peregrine Falcon (EO ID 6384) within the study area approximately 5.8 miles south of Alternatives 8, 9, 10 and 11 on South Padre Island. The falcons are also known to winter in the Laguna Madre area. Therefore, the proposed project may impact the Peregrine Falcon.

The Wood Stork is a rare inhabitant of the LANWR in the spring, summer and fall. In addition, there is appropriate habitat for this species within the study area. Therefore, the proposed project may impact the Wood Stork.

Scrubland and mangroves occur within the study area providing habitat for the Rose-throated Becard. Therefore, the proposed project may impact the Rose-throated Becard.

Brown Pelicans are common throughout the study area and were observed during site surveys. The proposed project may affect, and is likely to adversely affect the Brown Pelican. Wind currents in the vicinity of the existing Queen Isabella Causeway are known to disrupt pelican flight, sometimes resulting in mortality from vehicle strikes. Accordingly, a warning system is in place to notify drivers of the potential risk of pelican strikes during windy conditions.

The White-faced Ibis breeds and winters along the Texas Gulf Coast and is a common spring and fall inhabitant of the LANWR. There is suitable breeding and foraging habitat for this species within the study area. Therefore, the proposed project may impact the White-faced Ibis.

Least Terns are likely to occur within the study area, but the unprotected coastal species (*Sterna antillarum antillarum*) would be the one most likely encountered. Because the Interior Least Terns could winter in the project area, the proposed project may impact this species.

The Sooty Tern is known to nest in a colonial waterbird rookery near Port Isabel. The proposed project may impact the Sooty Tern.

Insects

Insect species may be directly affected by displacement due to habitat conversion within the proposed ROW. Individuals in the project area may also experience harassment-effects (in the form of disturbance of normal behavior or activities) as a result of construction. These effects would be temporary; occurring only during the duration of construction. Due to the relatively small home ranges of the threatened and endangered insect species, the clearing of ROW could lead to the destruction of an individual's home range. Due to the fossorial habits of the beetles, the clearing of ROW and earth moving construction activities could lead to the mortality of individual insects. As with bird species, the aerial habits of the royal moth and the Manfreda giant-skipper would allow the moths to avoid construction ground disturbing activities. However, both of these species have egg, larval, and pupal life cycle stages (potentially very extended) that would be vulnerable to impacts from construction ground disturbing activities. Individual insects occupying the proposed ROW would be pushed into adjacent habitats where they would be forced to compete with existing populations for food and cover resources.

Table 4-39 lists the insect species potentially impacted by project activities.

Table 4-39: Rare, Threatened and Endangered Insects

Scientific Name	Common Name
Agapema galbina	Tamaulipan agapema
Cicindela chlorocephala smythi	Smyth's tiger beetle
Cicindela nigrocoerulea subtropica	Subtropical blue-black tiger beetle
Sphingicampa blanchardi	Royal moth
Stallingsia maculosus	Manfreda giant-skipper

Source: TPWD July 16, 2009b; USFWS January 9, 2009i

Tamaulipan thorn-scrub vegetation occurs within the study area; therefore, the proposed project may impact the Tamaulipan agapema. Within the study area, suitable habitat also occurs for the Smyth's tiger beetle, subtropical blue-black beetle, royal moth, and the Manfreda giant-skipper. Therefore, the proposed project may impact these species.

Fish

Fish species could be directly impacted by the increased suspended sediment occurring during sediment disturbing activities associated with the placement of piers and pilings for the bridge structures. Individuals in the project area may also experience harassment-effects (in the form of disturbance of normal behavior or activities) as a result of construction. These effects would be temporary; occurring only during the duration of construction. The piers and pilings could benefit the fish species as the structures would provide habitat for the fish. Should a water crossing consist of a box culvert, a portion of the fish habitat would be converted to transportation use and fish in the area could be displaced into adjacent habitats.

Due to the lack of habitat in the study area, the proposed project would have no impact on the Rio Grande silvery minnow or the Rio Grande shiner.

As stated in **Chapter 3**, suitable habitat for the remaining rare, threatened and endangered fish species occurs within the project area.

Table 4-40 lists the fish species potentially impacted by project activities.

Table 4-40: Rare, Threatened and Endangered Fish

Scientific Name	Common Name
Anguilla rostrata	American eel
Awaous banana	River goby
Ctenogobius claytonia	Mexican goby
Microphis brachyurus	Opossum pipefish
Pristis pectinata	Smalltooth sawfish

Source: TPWD July 16, 2009b; USFWS January 9, 2009i

The American eel, river goby, Mexican goby, opossum pipefish and smalltooth sawfish may be impacted by the proposed project. The American eel, river goby, opossum pipefish and smalltooth sawfish could be directly impacted by the increased suspended sediment occurring during sediment disturbing activities associated with the placement of piers and pilings for the bridge structures. However, the piers and pilings could benefit the fish species as the structures would provide a substrate for aquatic organisms that could provide a food source. Should the water crossing consist of a box culvert, a portion of the habitat for the Mexican goby would be converted to transportation use and fish in the area could be displaced into adjacent habitat.

Mammals

Mammal species may be directly affected by displacement due to habitat conversion within the proposed ROW. Individuals in the project area may also experience harassment-effects (in the form of disturbance of normal behavior or activities) as a result of construction. These effects would be temporary; occurring only during the duration of construction. Because of the mobility of most mammals, direct mortality from project construction activity is unlikely to occur. However, fossorial species such as the Coues' rice rat and plains spotted skunk would be susceptible to mortality due to ROW and earth moving construction activities. The loss of nesting, foraging and cover habitats could impact the fecundity and survival of the mammal species. Individuals occupying the proposed ROW would be pushed into adjacent habitats where they would be forced to compete with existing populations for food and cover resources. Mammal species with relatively large home ranges or species that migrate between habitats would be impacted by the fragmentation of migration corridors and the increased risk of wildlife/vehicle collisions.

Because no suitable habitat occurs within the study area for the white-nosed coati or the jaguar, the proposed project would have no impact on these species.

Table 4-41 lists the mammal species potentially impacted by project activities.

Table 4-41: Rare, Threatened and Endangered Mammals

Scientific Name	Common Name
Choeronycteris mexicana	Mexican long-tongued bat
Felis yaguarondi	Jaguarundi
Lasiurus ega	Southern yellow bat
Leopardus pardalis	Ocelot
Mormoops megalophylla	Ghost-faced bat
Oryzomys couesi	Coues' rice rat
Spilogale putorius interrupta	Plains spotted skunk
Trichechus manatus	West Indian manatee

Source: TPWD July 16, 2009b; USFWS January 9, 2009i

A known location for the Mexican long-tongued bat (EO ID 3211) is listed in the Texas Natural Diversity Database approximately 5.3 miles north of the study area. In addition there is suitable habitat for the bat within the proposed ROW. Therefore, the proposed project may impact the Mexican long-tongued bat.

The Texas Natural Diversity Database lists known occurrences of the jaguarundi within the study area (EO ID 8139) and 6.3 miles west (EO ID 2415) of the study area. In addition, the jaguarundi has been known to inhabit the LANWR. The most recent confirmed jaguarundi sightings were in 2004. An unconfirmed sighting was reported in January 2005. The jaguarundi uses dense brush habitats very similar to those of the ocelot. Dense brush is considered prime jaguarundi habitat and light brush is considered marginal jaguarundi habitat. Alternatives 6 and 10 have the largest amount of impact (107.82 acres) and Alternatives 2, 5 and 9 would have the least amount of impact (4.79 acres). The proposed project may affect and is likely to adversely affect the jaguarundi.

A known occurrence of the southern yellow bat (EO ID 6796) was reported in the Texas Natural Diversity Database approximately 10.8 miles south of the study area in the Rio Grande Valley. There is suitable habitat for this species within the study area. Therefore, the proposed project may impact the southern yellow bat.

There are currently 13 confirmed resident ocelots at the LANWR (Sternberg and Mays 2011). In addition, there is a known occurrence of the ocelot (EO ID 881) within the ROW of all the proposed alternatives. Potential ocelot habitat has been calculated by combining the acreage amounts of light brush and dense brush vegetation communities (**Table 4-3**). Dense brush is considered prime ocelot habitat and light brush is considered marginal ocelot habitat. Alternatives 6 and 10 have the largest amount of impact (107.82 acres) and Alternatives 2, 5 and 9 would have the least amount of impact (4.79 acres). Numerous ocelot travel corridors have been identified in the project area. For these reasons, it has been determined that the proposed project may affect and is likely to adversely affect the ocelot.

Within the study area, there is suitable habitat for the ghost-faced bat, Coues' rice rat, and plains spotted skunk; therefore, the proposed project may impact these species.

The West Indian manatee inhabits gulf and bay systems like the Laguna Madre. The manatee feeds on submergent vegetation, predominantly seagrass, which would be impacted by the project. The manatee is currently extremely rare in the Texas gulf and bay system. As a result, the project may affect, but is not likely to adversely affect, the West Indian manatee. The Laguna Madre is considered habitat for the West Indian manatee; therefore, manatee habitat could be temporarily impacted during construction. A summary of potential construction methods is discussed in **Chapter 2**. The following table (**Table 4-42**) summarizes the potential

temporary impacts to manatee habitat from the four possible construction methods discussed in **Chapter 2**.

Table 4-42: Temporary Construction Impacts to West Indian Manatee Habitat

Alternative	Parallel Dredging (160 ft) acres	Parallel Trestle (80 ft) acres	Parallel Sheet Piling/Haul Road (80 ft) acres	Top Down or Stepped Out Construction (20 ft) acres
1, 2	223.40	146.69	146.69	92.82
3	225.16	149.88	149.88	93.56
4, 5	217.85	144.99	144.99	90.51
6, 7	216.26	143.94	143.94	89.84
8, 9	213.20	141.83	141.83	88.46
10, 11	200.40	133.34	133.34	83.19

Source: HNTB 2012
Note: Temporary impacts determined using best available data at the time of draft environmental impact statement preparation. More refined construction methods and considerations will continue to develop through continued project coordination and permit coordination for the recommended preferred alternative following the public hearing and during preparation of the final environmental impact statement.

Reptiles

Reptile species may be directly affected by displacement due to habitat conversion within the proposed ROW. Individuals in the project area may also experience harassment-effects (in the form of disturbance of normal behavior or activities) as a result of construction. These effects would be temporary; occurring only during the duration of construction. Due to the relatively small home ranges of some of the threatened and endangered reptile species, the clearing of ROW could lead to the destruction of an individual's home range. Due to the fossorial habits of the snakes, Texas horned lizard, keeled earless lizard and Texas tortoise, the clearing of ROW and earth moving construction activities could lead to the mortality of individual reptiles. Individual terrestrial reptiles occupying the proposed ROW would be pushed into adjacent habitats where they would be forced to compete with existing populations for food and cover resources. However, the mobility of the aquatic reptiles would allow the sea turtles to avoid bridge construction activities.

The soils in the project area are silty, silty clay and silty clay loam, which are not conducive to support the habitat of the Texas scarlet snake. Therefore, the proposed project would have no impact on this species.

Table 4-43 lists the reptile species potentially impacted by project activities.

Table 4-43: Rare, Threatened and Endangered Reptiles

Scientific Name	Common Name
Dermochelys coriacea	Leatherback sea turtle
Caretta caretta	Loggerhead sea turtle
Chelonia mydas	Green sea turtle
Coniophanes imperialis	Black-striped snake
Drymarchon corais	Indigo snake
Drymobius margaritiferus	Speckled racer
Eretmochelys imbricate	Hawksbill sea turtle
Gopherus berlandieri	Texas tortoise
Holbrookia propinqua	Keeled earless lizard
Lepidochelys kempii	Kemp's ridley sea turtle
Leptodeira septentrionalis septentrionalis	Northern cat-eyed snake
Phrynosoma cornutum	Texas horned lizard

Source: TPWD July 16, 2009b; USFWS January 9, 2009i

Because the leatherback sea turtle is unlikely to occur in the Laguna Madre because of the shallow conditions, and because this turtle may, but is unlikely to nest on South Padre Island, the proposed project may affect, but is not likely to adversely affect the leatherback sea turtle.

Only minor and solitary nesting has been recorded for the loggerhead sea turtle along the coasts of the Gulf of Mexico; however, loggerhead sea turtles have been identified in the vicinity of Mansfield Channel. The project may affect, and is likely to adversely affect the loggerhead sea turtle.

A known occurrence within the study area of the green sea turtle (EO ID 8993) was reported in the Texas Natural Diversity Database. The green sea turtle has been documented around Mansfield Channel and is known to occur in the lower Laguna Madre (Sea Turtle Inc., personal communication). According to the USFWS, hundreds of green sea turtles regularly occur in the Lower Laguna Madre year-round and depend on seagrass beds for important foraging habitat. The project may affect, and is likely to adversely affect the green sea turtle.

The hawksbill sea turtle is found in the Gulf of Mexico and is more abundant in areas where coral reefs are present; however, it is a rare visitor to the Texas Gulf Coast. The species has been documented within the vicinity of Mansfield Channel.

On June 13, 1998 the first hawksbill nest recorded on the Texas coast was found at Padre Island National Seashore. The nest contained 140 eggs of which 133 hatched and 132 were released into the gulf (one weak hatchling was taken to a rehabilitation facility). This is the only documented nest found for this species on the Texas coast. Due to the rare occurrence of this species to the Texas coast and the lack of suitable nesting or foraging habitat for this species within the study area, the hawksbill sea turtle is unlikely to occur in the proposed ROW. Habitat for these turtle species includes the Gulf of Mexico and bay systems like the Laguna Madre. These species feed on submergent vegetation, predominantly seagrass, which would be impacted by the project. Therefore, the project may affect, but is not likely to adversely affect the hawksbill sea turtle.

The black-striped snake is known to occur in the Laguna Madre Conservation Area. The Texas Natural Diversity Database lists a known occurrence of the black-striped snake (EO ID 6262) approximately 5.6 miles southwest of the proposed ROW. There is suitable habitat for this species within the study area; therefore, the proposed project may impact the black-striped snake.

The speckled racer is a known to occur approximately 10.6 miles south of the proposed ROW in the Rio Grande Valley (EO ID 5937). There is the potential for suitable habitat for this species within the study area; therefore, the proposed project may impact the speckled racer.

The Texas Natural Diversity Database lists a known location of the indigo snake (EO ID 7926) approximately 9 miles south of the proposed ROW and an indigo snake was observed while visiting the LANWR approximately 5 miles north. The indigo snake is also known to occur in the Laguna Madre Conservation Area. There are suitable riparian and thorn bush-chaparral woodlands in the project area for this species. Therefore, the proposed project may impact the indigo snake.

The Texas Natural Diversity Database lists a known occurrence of the Texas tortoise (EO ID 8278) approximately 6.4 miles south of the proposed ROW and a tortoise was observed during field surveys near Alternatives 1, 2, 4, 7, 8, 9 and 10. In addition, there is appropriate habitat for this species within the study area. Therefore, the proposed project may impact the Texas tortoise.

Numerous keeled earless lizards were observed in the dunes along Park Road 100 during field surveys. The keeled earless lizard is known to occur within the study area. Therefore, the proposed project may impact the keeled earless lizard.

The Kemp's ridley sea turtle has been identified in the vicinity of Mansfield Channel and is known to nest throughout South Padre Island. Due to the proximity of the Kemp's ridley sea turtle to the proposed ROW, the proposed project may affect, and is likely to adversely affect the species.

The Texas Natural Diversity Database lists a known occurrence of the northern cat-eyed snake (EO ID 4888) approximately 9.7 miles southwest of the proposed ROW. Suitable habitat for this species can be found within the riparian corridor bisected by Alternatives 1, 4, and 8. The proposed project may impact the northern cat-eyed snake.

Harvester ants, the food source for the Texas horned lizard, were observed in the project area during field surveys (Stebbins 1985). In addition, the Texas Natural Diversity Database lists a known occurrence of the lizard (EO ID 8284) approximately 8.6 miles south of the proposed ROW. There is suitable habitat for this species within the study area. The proposed project may impact the Texas horned lizard.

Mollusks

The mollusk species could be directly impacted by the increased suspended sediment occurring during sediment disturbing activities associated with the placement of piers and pilings for the bridge structures. Individuals in the project area may also experience aggravation (in the form of disturbance of normal behavior or activities) as a result of construction. These effects would be temporary; occurring only during the duration of construction. The piers and pilings could benefit the mollusk species as the structures would provide a substrate for and habitat for the mollusks. Should water crossings consist of a box culvert, a portion of the mollusk habitat would be converted to transportation use and mollusks in the area could be displaced into adjacent habitats.

There is no suitable habitat for the Texas hornshell; therefore, the proposed project would have no effect on this species.

There is no suitable habitat for the Salina mucket, the false spike mussel, or the Mexican fawnsfoot mussel within the study area; therefore, the proposed project would have no impact on these rare mollusks.

Summary of Threatened and Endangered Species Impacts

Sensitive species associated with the Texas Gulf Coast area include marine and estuarine species such as the sea turtle and terrestrial species such as the ocelot, Northern Aplomado Falcon and Piping Plover. In addition, several rare and endangered plants such as Vasey's adelia, star cactus, Texas ayenia, Runyon's cory cactus, Green Island echeandia, Runyon's water-willow and Shinner's rocket are found nowhere else except the South Texas Gulf Coast and Lower Rio Grande Valley area.

The proposed project has the potential to affect six species of rare plants, five species of rare amphibians, 24 species of rare birds, five species of rare insects, five species of rare fish, eight species of rare mammals and 11 species of rare reptiles. The occurrences of these species within or adjacent to the study area are listed in the Texas Natural Diversity Database.

There are 13 confirmed resident ocelots at the LANWR. In addition, there are six known occurrences of the ocelot within the project area reported by the Texas Natural Diversity Database. In addition, numerous ocelot travel corridors have been identified in the project area; therefore, the proposed project is likely to adversely affect the ocelot. Potential ocelot habitat has been calculated by combining the acreage amounts of light brush and dense brush vegetation communities. Dense brush is considered prime ocelot habitat and light brush is considered marginal ocelot habitat. Alternative 10 has the largest amount of impact (107.82 acres) and Alternatives 2, 5 and 9 would have the least amount of impact (4.79 acres). Alternative 6 would impact 107.82 acres of dense and light brush.

A biological assessment has been prepared in anticipation of formal consultation with USFWS under Section 7 of the Endangered Species Act.

Marine Mammal Protection Act

No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is likely that at least some of these projects would result in impacts to marine mammals, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts to marine mammals.

Build Alternatives

The "incidental take" of other marine mammals, such as the bottlenose dolphin, may also occur as a result of the proposed project due to acoustical impacts associated with the operation of construction equipment (e.g. pile driving) in the Laguna Madre. Pile driving would potentially result in Level B Harassment of marine mammals. Level B Harassment means the activity has the potential to disturb a marine mammal or marine mammal stock in the wild by disrupting behavioral patterns, but which does not have the potential to injure a marine mammal or marine mammal stock in the wild.

Coordination with NOAA Fisheries would be conducted to determine if the proposed project has the potential to result in incidental take of marine mammal species. If NOAA Fisheries determine that incidental take would occur, a request for an Incidental Harassment Authorization would be prepared and submitted to NOAA Fisheries.

4.8 CULTURAL RESOURCES IMPACTS

The following sections describe the potential impacts to cultural resources identified in **Chapter 3**. This evaluation of impacts focuses on those cultural resources currently listed in, or eligible for, the National Register of Historic Places (NRHP).

4.8.1 Impacts to Archeological Resources

4.8.1.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is possible that at least some of these projects would impact archeological resources, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts on archeological resources.

4.8.1.2 Build Alternatives

In addition to the identification of known archeological resources within or near the build alternatives, areas of low probability for containing intact archeological deposits were identified using National Resource Conservation Service soil maps and the *Soil Survey of Cameron County, Texas* (Williams, et al. 1977), the Bureau of Economic Geology's *Geologic Atlas of Texas McAllen-Brownsville Sheet* (University of Texas Bureau of Economic Geology 1976), La Coma, Port Isabel and Laguna Vista, Texas USGS 7.5-minute topographic quadrangle maps, planning documents, and aerial photography of the study area. Areas where the preservation of intact archeological deposits is considered unlikely were identified as *low probability areas*. These areas were selected based on the prevalence of disturbances, proximity/distance of previously recorded archaeological sites, soils, topography, and the general character of the landscape.

Previously disturbed areas: The majority of the highlighted low probability areas coincide with existing roadways, pipeline ROW, or canals. These areas have been previously impacted by construction and maintenance activities, and as such the potential for intact, significant archaeological sites or historic structures within the actual ROWs is considered low as they would have been destroyed or heavily damaged. Such areas typically do not require archaeological surveys due to their disturbed nature.

Previously recorded sites (extant archaeological site patterns): The amount of archaeological investigation within the Study Area is relatively minimal. Virtually all of the previously recorded archaeological sites in the immediate vicinity occur along the banks of the Resaca de la Gringa, which is located to the north of the Study Area within the LANWR. In the general South Padre/Brownsville region however, studies have consistently documented cultural resources in similar settings adjacent to extant or ancient waterways or on topographic high points. Based on this data, a preliminary analysis of prehistoric settlement patterns suggests that the resacas and topographic high points were targeted by prehistoric peoples as an ideal locale for habitation or resource procurement.

Soils/Geology: Before a thorough sample survey is conducted of a study area, archaeologists look for areas that posses certain types of soils or landforms, particularly those formed by recent (i.e., within the last 10,000 years) alluvial processes or other natural phenomena. For example, landforms such as river terraces or stream banks have the highest probability to contain the deep soils capable of harboring intact, significant cultural materials due to the continuous build-up of sediments as a result of floodwater activity. Conversely, if an area possesses extremely rocky soils that are underlain by near-surface bedrock, then there is essentially no probability for deeply buried, preserved or intact cultural resources. While archaeological sites are often recorded in these settings, such sites have typically been impacted by erosion, agricultural activity, or modern construction.

For the Study Area, soils thought to have a low probability for harboring significant cultural resources were determined to be those that are located within marshy areas, tidal flats, or coastal dunes. As these areas were not typically occupied by humans and are frequently inundated as a result of storm surges, the preservation potential of cultural resources is low.

Topography: A review of the topographic maps for the Study Area determined that landforms such as tidal flats, coastal dunes, and marshy areas have a low probability for harboring intact, cultural resources due to frequent or persistent inundation. Conversely, as the majority of previously recorded sites are located directly adjacent to a number of resacas located to the north of the Study Area, these features were determined to have the highest probability for intact cultural resources. Resacas are relic drainage channels of the Rio Grande River and have a long history of sedimentation, thus creating a favorable environment for buried cultural resources.

Character of the Landscape: The character of the landscape as a criterion for determining the probability for intact cultural resources refers mostly to land use, both historically and recently. Historically, the Study Area has been heavily grazed, continuously used for agricultural activities, and more recently has been impacted by the installation of pipelines, canals, and irrigation ditches. Additionally, much of the Study Area is composed of landforms such as lowland marshy areas, tidal flats, reservoirs, and coastal dunes that typically have a low to moderate potential for harboring intact cultural resources.

There are two archeological sites and four shipwrecks within one mile of the build alternatives. There are no known archeological sites or shipwrecks within the proposed ROW of any of the alternatives. An archeological survey of the recommended preferred alternative would be conducted and the findings reported in the final environmental impact statement.

Alternative 1

Two terrestrial archaeological sites and two shipwrecks are located in close proximity to Alternative 1. Site 41CF39 is located approximately 0.5 miles north of Alternative 1 on the southern banks of the De La Gringa Resaca on the mainland. The site consists of shell and fish otoliths and recommendations on the site form include further testing of the site (Atlas). Site 41CF104 is located directly adjacent to Alternative 1 approximately 0.5 miles south of the intersection of Alternative 1 and Park Road 100. The site consists of a single Paleo-Indian Meserve point located on the bank of the Gulf of Mexico (Atlas). No recommendations were stated regarding site significance or further work. An unknown vessel (#1531), recorded in 1975 as archaeological site 41CF110, is located 0.5 miles east of Alternative 1 in the Gulf of Mexico. The site form dates the shipwreck to the last half of the 19th century and recommends the site eligible for National Register of Historic Places (NRHP) and State Archaeological Landmark

nomination. Additionally, the Startlan vessel (#2333), located approximately 0.9 miles north of Alternative 1, was lost in 1949. The shipwreck is located on the gulf side of South Padre Island.

Alternative 2
Approximately 3.83 miles of Alternative 2 are delineated as low probability areas. Cultural resources sites 41CF104, 41CF110 (shipwreck #1531), and the shipwrecked Startlan vessel (#2333) are located in close proximity, but not within the proposed ROW of the alternative as it follows Park Road 100 on South Padre Island.

Alternative 3
Approximately 6.83 miles of Alternative 3 are delineated as low probability areas. Additionally, cultural resources sites 41CF104 and 41CF110 (shipwreck #1531) and the Startlan vessel (#2333) are also located in close proximity, but not within the proposed ROW of the alternative as it follows Park Road 100 on South Padre Island.

Alternative 4
Approximately 8.61 miles of Alternative 4 are delineated as low probability areas. An unknown shipwrecked vessel (#1081) that pre-dates 1977 is recorded on the outer periphery of the Gulf Intracoastal Waterway approximately 0.28 miles south of Alternative 4. Additionally, archaeological sites 41CF104 and 41CF110 (shipwreck #1531) are also located just east of South Padre Island in close proximity, but not within the proposed ROW of the alternative as it follows Park Road 100.

Alternative 5
Approximately 3.18 miles of Alternative 5 are delineated as low probability areas. Cultural resource sites 41CF104 and 41CF110 (shipwreck #1531) are also located in close proximity, but not within the proposed ROW of the alternative as it follows Park Road 100 on South Padre Island. An unknown shipwrecked vessel (#1081) that predates 1977 is documented near the Gulf Intracoastal Waterway is also located approximately 0.2 miles south of Alternative 5.

Alternative 6
Approximately 6.18 miles of Alternative 6 are delineated as low probability areas. Cultural resource sites 41CF104 and 41CF110 (shipwreck #1531) are also located in close proximity, but not within the proposed ROW of the alternative as it follows Park Road 100 on South Padre Island. An unknown shipwrecked vessel that pre-dates 1977 (#1083) is recorded on the outer periphery of the Gulf Intracoastal Waterway is also located south of the proposed alternative.

Alternative 7
Approximately 3.18 miles of Alternative 7 are delineated as low probability areas. Cultural resource sites 41CF104 and 41CF110 (shipwreck #1531) are also located in close proximity, but not within the proposed ROW of the alternative as it follows Park Road 100 on South Padre Island. The unknown shipwrecked vessel (#1083) documented near the Gulf Intracoastal Waterway is also located approximately 0.1 miles south of Alternative 7.

Alternative 8
Approximately 5.80 miles of Alternative 8 are delineated as low probability areas. The unknown shipwrecked vessel (#1083) is recorded on the outer periphery of the Gulf Intracoastal Waterway approximately 0.2 miles north of Alternative 8.

Alternative 9
Approximately 0.375 miles of Alternative 9 are delineated as low probability areas. The unknown shipwrecked vessel located near the Gulf Intracoastal Waterway (#1083) is located 0.16 miles north of Alternative 9.

Alternative 10
Approximately 3.375 miles of Alternative 10 are delineated as low probability areas. No cultural resource sites or shipwrecks are located in close proximity to Alternative 10.

Alternative 11
Approximately 0.375 miles of Alternative 11 are delineated as low probability areas. No cultural resource sites or shipwrecks are located in close proximity to Alternative 11.

4.8.2 Impacts to Non-Archeological Historic Resources

This section identifies non-archeological historic resources (buildings, structures, objects, districts) within the area of potential effect of the build alternatives that are listed in, or eligible for listing in, the NRHP. Impacts to non-archeological historic resources can be classified as either direct or indirect, depending on the proximity of the proposed action. A direct impact is defined as a direct taking in which the proposed ROW would include all of an existing property and/or resource and any portion of its associated land. Efforts to avoid or minimize such impacts were undertaken during the planning stages for each reasonable alternative.

4.8.2.1 No-Build Alternative

Under the No-Build Alternative, it is assumed that other planned projects in the study area would occur. These projects would include projects on the CCRMA system as well as projects planned by TxDOT and local entities. Although it is possible that at least some of these projects would impact historic resources, it is not possible to accurately assess the extent of these impacts until such time as the location and ROW requirements of these projects have been determined. Under the No-Build Alternative, there would be no 2nd Access Project-related impacts on historic resources

4.8.2.2 Build Alternatives

The historic-age resources within the area of potential effect have been evaluated in terms of their physical relationship to the reasonable alternatives. On July 9, 2009, TxDOT Environmental Affairs Division approved the area of potential effect as 300 feet from the edge of the existing or potential ROW, whichever is greater. As noted in **Chapter 3**, within the Survey Area there is one NRHP listed property (the Port Isabel Lighthouse) and one NRHP-eligible property (the 1936 Centennial Marker for the Old Point Isabel Lighthouse). Within the area of potential effects of the reasonable alignments, 21 historic-age non-archeological resources on seven properties were identified and evaluated for NRHP eligibility. **Table 4-44** lists resources by property type, provides the number of locations for each property type, the number of non-archeological historic-age resources associated with that property, and the NRHP Eligibility Recommendation.

Table 4-44: Non-Archeological Historic-Age Resources Inventory

Property Type	Historic-Age Resource Locations	Historic-Age Resources	NRHP Eligibility Recommendations
Agricultural	5	19	None
Municipal	1	1	None
Transportation	1	1	None
TOTAL	**7**	**21**	None

Source: HNTB Non-Archeological Historic Resources Reconnaissance Survey 2009

Table 4-45 below lists each of the 21 non-archeological historic-age resources, which alternative it is within, approximate location, the property type, stylistic influence, date of construction, integrity issues and comments.

Table 4-45: Non-Archeological Historic-Age Resource Inventory

Site No.	Alternative	Approximate Location	Property Type	Stylistic Influence	Date of Construction	Integrity Issues/ Comments
101	1, 3, 4, 5, 6, 8, 10	North side of SH 100 at Buena Vista Road	Agriculture/ Livestock Pen and Chute	None	c. 1940	Wood frame and post livestock pen and loading chute; still in use.
102	1, 3, 4, 5, 6, 8, 10	North of SH 100 at west side of Buena Vista Road	Agricultural/ Livestock Ranching	None	c. 1930	One story wood frame side gabled house additions.
103a	1, 3, 4, 5, 6, 8, 10	North of FM 510 at east side of Buena Vista Road	Agriculture/Shed	None	c. 1940	Wood frame side gabled shed; sheet metal and shake roof.
103b	1, 3, 4, 5, 6, 8, 10	North of FM 510 at east side of Buena Vista Road; adjacent to Site 103a	Agriculture/Barn	None	c. 1940	Wood frame front gabled barn; open air shed roof addition.
103c	1, 3, 4, 5, 6, 8, 10	North of FM 510 on west side of Buena Vista Road	Agriculture/Barn	None	c. 1940	Wood frame side gabled barn; sheet metal roof.
104a	2, 5, 7, 9, 11	South of FM 510 at Holly Beach Road	Agriculture/ Shed	None	c. 1960	Front facing shed with sheet metal roof.
104b	2, 5, 7, 9, 11	South of FM 510 at Holly Beach Road	Agriculture/ Shed	None	c. 1960	Side gabled, 8 bay open air shed housing small livestock.
105	2, 5, 7, 9, 11	Holly Beach Road north of FM 510 at wastewater treatment plant	Municipal/ Spillway	None	c. 1950	Abandoned concrete spillway with screw-turn Tainter gate.
106a	1, 4, 8	North of SH 100, bisecting Buena Vista Road	Agriculture/ Irrigation Facility	None	c. 1930	Unlined irrigation canal is currently dry and partly overgrown with vegetation.
106b	1, 4, 8	North of FM 510 along east side of Buena Vista Road	Agriculture/ Irrigation Standpipe	None	c. 1950	Typical three section concrete standpipe.

Site No.	Alternative	Approximate Location	Property Type	Stylistic Influence	Date of Construction	Integrity Issues/ Comments
106c	1, 4, 5, 6, 8, 10	North of FM 510 along east side of Buena Vista Road	Agriculture/ Irrigation Standpipe	None	c. 1950	Typical four section concrete standpipe.
106d	1, 4, 8	North of FM 510 along east side of Buena Vista Road	Agriculture/ Irrigation Standpipe	None	c. 1950	Small typical concrete standpipe.
106e	1, 4, 8	North of FM 510 at east side of Buena Vista Road	Agriculture/ Irrigation Standpipe	None	c. 1950	Typical four section concrete irrigation standpipe.
106f	1, 4, 8	North of FM 510 at west side of Buena Vista Road	Agriculture/ Irrigation Standpipe	None	c. 1950	Typical four section concrete irrigation standpipe.
106g	1, 4, 8	North of FM 510 at west side of Buena Vista Road	Agriculture/ Diversion Stand	None	c. 1950	Poured in place concrete standpipe.
106h	1, 4, 8	South of Center Line Road bisecting Buena Vista Road	Agriculture/ Culvert	None	c. 1950	Dual reinforced concrete pipe culvert in poor condition.
106i	1, 4, 8	South of Center Line Road bisecting Buena Vista Road	Agriculture/ Irrigation Facility	None	c. 1930	Unlined irrigation canal; contains water.
106j	1, 4, 8	South side of Center Line Road east of Buena Vista Road	Agriculture/ Irrigation Standpipe	None	c. 1960	Small concrete standpipe.
106k	1, 4, 8	South side of Center Line Road east of Buena Vista Road	Agriculture/ Irrigation Standpipe	None	c. 1950	Typical three section standpipe.
106l	1, 4, 8	South side of Center Line Road east of Buena Vista Road, adjacent to Site 107n	Agriculture/ Irrigation Standpipe	None	c.1930	Hexagonal standpipe base with wheel crank. Operated flood gate control.
107	1 - 11	Within Laguna Madre between South Padre Island and Texas Mainland	Transportation/ Shipping	None	c. 1949	Linear shipping canal managed by the USACE.

Source: HNTB Non-Archeological Historic Resources Reconnaissance Survey 2009

The area of potential effect contains some areas that follow an existing alignment, some that are on a new location, and are generally rural or undeveloped.

The Gulf Intracoastal Waterway (**Resource 107**) would require continuous operation throughout construction of the proposed project. Particular care was taken by design engineers to avoid an

adverse effect to the Gulf Intracoastal Waterway. The design of the reasonable alternatives allows for adequate horizontal and vertical clearance so that the function would not be impaired.

None of the 21 historic-age resources identified within the area of potential effect were recommended eligible for inclusion in the NRHP. Therefore, there is no potential to affect any NRHP eligible historic-age resources. An intensive survey is not recommended. Because this project is a major federal action, individual project coordination with the State Historic Preservation Officer is required.

Pursuant to Stipulation VI "Undertakings with the Potential to Affect Historic Resources" of the Programmatic Agreement for Transportation Undertakings between the FHWA, State Historic Preservation Officer, the Advisory Council on Historic Preservation, and the TxDOT Memorandum of Understanding, project historians recommend that none of the historic-age resources are eligible for listing in the NRHP.

4.9 HAZARDOUS MATERIAL SITES

4.9.1 No-Build Alternative

Hazardous materials sites do exist within the study area, as shown on **Exhibit 3-16**; however, the No-Build Alternative would not result in hazardous materials impacts associated with the construction or operation of the proposed project.

4.9.2 Build Alternatives

Construction of any of the build alternatives would have a low potential for creating hazardous material impacts on the environment. Impacts associated with hazardous materials would most likely occur during construction and would be related to activities on or near existing hazardous material sites. These hazardous material sites either have already impacted and/or have the potential to impact the existing environment. Regulated sites also create the potential of contaminating sites adjacent to them, thereby creating a risk for the acquisition of those properties.

ROW acquisition would be required for the recommended preferred alternative. Prior to ROW negotiation and/or acquisition, where warranted, a limited American Society for Testing and Materials Phase I Environmental Site Assessment would be conducted. A Phase II Environmental Site Assessment may also be necessary depending on the findings of the Phase I Environmental Site Assessment. The Phase II Environmental Site Assessment would provide additional testing and sampling of all potential hazardous sites and would include a remediation plan, if warranted.

Relocation and/or removal of all existing structures along the recommended preferred alternative would require asbestos and lead-based paint surveys to be completed for these structures. Asbestos and lead paint inspections, specifications, notification, license, accreditation, abatement and disposal, as applicable, would comply with federal and state regulations. Asbestos and lead-based paint issues would be addressed during the ROW process prior to construction. If suspect material is encountered, a mitigation plan for the removal and disposal of materials containing hazardous materials would need to be developed according to federal, state and local regulations.

4.9.2.1 Hazardous Materials Sites

As a result of the regulatory database search, no documented federal or state regulated hazardous materials sites were identified within the American Society for Testing and Materials 1527-05 search distances of any of the build alternatives (Banks 2010). **Exhibit 4-20** shows the location of the build alternatives and the lack of hazardous materials sites within the search distances of the proposed ROWs for each Build Alternative. The search distance for each database is included in Section 3.9.1, **Table 3-26**. Oil and gas wells and well cluster sites may pose a potential hazardous materials risk to the proposed project, and will be discussed in the next section of this chapter. There is a minor risk that non-documented hazardous materials sites could be located within the project area.

4.9.2.2 Oil/Gas Well Sites

There were a total of seven gas wells identified in the 0.25 mile search radius of the build alternatives (Banks 2010). These included two plugged gas wells, two sidetrack wells (wells that are drilled vertically and then pumped horizontally), two dry holes, and one permitted location. One well, listed as a sidetrack well surface location, is located within the ROW of Alternative 3. The other six wells are within 0.25 mile of Alternatives 1, 2, 3, 4, 5, 6, 7, 8, and 10 ROWs. Alternative 9 is the only build alternative with no gas wells within 0.25 mile of the ROW. There were no oil wells, producing or otherwise, identified within the study area search radius. **Table 4-46** lists the identified gas well sites, and their locations are shown in **Exhibit 4-20**.

Table 4-46: Oil/Gas Wells Within Study Area

Map ID No.	Company	Well Status and Type	Well ID #	Build Alternative Potentially Impacted	Potential Risk
2	State Holly Beach Unit #1	Plugged Gas	42-061-00053-00	6, 7, 10, 11	Low
5	State Tract 726	Sidetrack Well Surface Location	42-061-30500-00	6, 7, 10, 11	Low
10	State Lease 713	Sidetrack Well Surface Location	42-061-305012-00	3	Moderate
11	Laguna Madre State Tract 713	Plugged Gas Well	42-061-00051-00	1, 2, 3, 4, 5	Low
13	Unknown	Dry Hole	unknown	6, 7	Low
30	Unknown	Permitted Location	42-061-30503-00	1, 3, 4, 6, 8, 10	Low
38	Unknown	Dry Hole	unknown	1, 2, 3	Low

Source: Banks Database Report 2010

Oil and gas well sites that were identified in the regulatory database search were ranked to evaluate the potential for contamination to the build alternatives. The evaluation of risk potential was based on the status of the well and the proximity to the build alternative alignments. Sites that are likely to impact highway construction are categorized as “high risk”. Sites that have the potential to contaminate the ROW and may impact highway construction are categorized as “moderate risk.” Sites categorized as “low risk” have some potential for contamination, but are not likely to impact highway construction.

Of the seven gas well sites that occur within the study area, one gas well has the potential to be directly impacted. One of the gas wells (Map ID No. 10) is located near the shoreline and is crossed by the alignment of Alternative 3. Based on its location within the proposed ROW of Alternative 3, this well poses a moderate risk to highway construction.

Four wells (Map ID Nos. 2, 11, 13, and 38), which are located within the Laguna Madre, are dry holes or have been plugged and are no longer active. The well listed as Map ID 2 is adjacent to Alternatives 6, 7, 10 and 11. The well listed as Map ID 11 is adjacent to Alternatives 1, 2, 3, 4, and 5. The well listed as Map ID 13 is adjacent to Alternatives 6 and 7. The well listed as Map ID 38 is adjacent to Alternatives 1, 2, and 3. The remaining two well locations, Map ID Nos. 5 and 30, are located on land. The well depicted by Map ID No. 5 is a sidetrack well surface location located adjacent to Alternatives 6, 7, 10 and 11. The well depicted by Map ID No. 30 is a permitted location and is located adjacent to Alternatives 1, 3, 4, 6, 8 and 10. These wells pose a low risk to highway construction. It is recommended that further investigation of each of these sites be conducted prior to construction. The remaining sites identified in the oil and gas well search are located at a distance from the build alternatives and should not pose a risk to construction activities associated with any of the build alternatives.

Impacts to pipelines are addressed under Utilities in **Chapter 4**.

4.10 IMPACTS TO VISUAL AND AESTHETIC QUALITY

4.10.1 No-Build Alternative

The No-Build Alternative would not result in visual and aesthetic quality impacts associated with the construction or operation of the proposed project.

4.10.2 Build Alternatives

4.10.2.1 Visual Assessment Methodology

The visual impacts of project alternatives are determined by assessing the visual resource change due to the project and predicting viewer response to that change. Visual resource change is the sum of the change in visual character and change in visual quality. The first step in determining visual resource change is to assess the compatibility of the proposed project with the visual character of the existing landscape. The second step is to compare the visual quality of the existing resources with projected visual quality after the project is constructed. The third step is to determine the viewer response to project changes, which is the sum of viewer exposure and viewer sensitivity to the project. The resulting level of visual impact is determined by combining the severity of resource change with the degree to which people are likely to oppose the change. In order to evaluate changes in visual resources, 14 key viewpoints to depict the current visual character of the visual environment study area were identified. The key viewpoints are the points from which the selected key views were analyzed. Key viewpoints were identified using FHWA criteria and are shown in **Table 4-47** below and correspond with the key views in **Exhibit 4-21** (the viewpoints from which the selected key views were analyzed are represented by yellow points on the triangles that represent the key views in the exhibit).

Table 4-47: Key Viewpoints

Alternative	Number*	Key View	Description
1	1	Looking NW towards Alternative 1 from SH 100	Representative view towards Alternative 1 from SH 100
	2	Looking East from FM 510 towards Alternative 1	Representative view of Alternative 1 experienced by users of FM 510
	3	Looking NW from roadway south of Center Line Road towards Alternative 1	Representative view of Alternative 1 from roadway south of Center Line Road
	10	Looking East from the mainland towards Alternative 1	Representative view from the Holly Beach area towards Alternative 1
	12	Looking West from South Padre Island towards Alternative 1	Representative view from South Padre Island towards Alternative 1
2	4	Looking NE from SH 100 towards Alternative 2	Representative view of Alternative 2 experienced by users of SH 100
	5	Looking West from FM 510 towards Alternative 2	Representative view of Alternative 2 experienced by residential properties and users of FM 510
	6	Looking West from Holly Beach Road towards Alternative 2	View experienced by drivers on Holly Beach Road looking towards Alternative 2
	10	Looking East from the mainland towards Alternative 2	Representative view from the Holly Beach area towards Alternative 2
	12	Looking West from South Padre Island towards Alternative 2	Representative view from South Padre Island towards Alternative 2
3	1	Looking NW towards Alternative 3 from SH 100	Representative view towards Alternative 3 from SH 100
	9	Looking NW from Holly Beach area towards Alternative 3	Representative view of Alternative 3 from Holly Beach area
	10	Looking East from the mainland towards Alternative 3	Representative view from the Holly Beach area towards Alternative 3
	12	Looking West from South Padre Island towards Alternative 3	Representative view from South Padre Island towards Alternative 3
4	1	Looking NW towards Alternative 4 from SH 100	Representative view towards Alternative 4 from SH 100
	2	Looking East from FM 510 towards Alternative 4	Representative view of Alternative 4 experienced by users of FM 510
	3	Looking NW from roadway south of Center Line Road towards Alternative 4	Representative view of Alternative 4 from roadway south of Center Line Road
	10	Looking East from the mainland towards Alternative 4	Representative view from the Holly Beach area towards Alternative 4
	13	Looking West from South Padre Island towards Alternative 4	Representative view from South Padre Island towards Alternative 4
5	4	Looking NE from SH 100 towards Alternative 5	Representative view of Alternative 5 experienced by users of SH 100
	5	Looking West from FM 510 towards Alternative 5	Representative view of Alternative 5 experienced by residential properties and users of FM 510
	6	Looking West from Holly Beach Road towards Alternative 5	View experienced by drivers on Holly Beach Road looking towards Alternative 5
	10	Looking East from the mainland towards Alternative 5	Representative view from the Holly Beach area towards Alternative 5
	13	Looking West from South Padre Island towards Alternative 5	Representative view from South Padre Island towards Alternative 5

Alternative	Number*	Key View	Description
6	1	Looking NW towards Alternative 6 from SH 100	Representative view towards Alternative 6 from SH 100
	7	Looking North from south of Holly Beach Road towards Alternative 6	View experienced south of Holly Beach Road looking toward Alternative 6
	8	Looking South from Holly Beach area towards Alternative 6	View experienced by users of Holly Road looking toward Alternative 6
	11	Looking East from the mainland towards Alternative 6	Representative view from the Holly Beach area towards Alternative 6
	13	Looking West from South Padre Island towards Alternative 6	Representative view from South Padre Island towards Alternative 6
7	4	Looking NE from SH 100 towards Alternative 7	Representative view of Alternative 7 experienced by users of SH 100
	5	Looking West from FM 510 towards Alternative 7	Representative view of Alternative 7 experienced by residential properties and users of FM 510
	7	Looking North from south of Holly Beach Road towards Alternative 7	View experienced south of Holly Beach Road looking toward Alternative 7
	8	Looking South from Holly Beach area towards Alternative 7	View experienced by residential properties looking towards Alternative 7
	11	Looking East from the mainland towards Alternative 7	Representative view from the Holly Beach area towards Alternative 7
	13	Looking West from South Padre Island towards Alternative 7	Representative view from South Padre Island towards Alternative 7
8	1	Looking NW towards Alternative 8 from SH 100	Representative view towards Alternative 8 from SH 100
	2	Looking East from FM 510 towards Alternative 8	Representative view of Alternative 8 experienced by users of FM 510
	3	Looking NW from roadway south of Center Line Road towards Alternative 8	Representative view of Alternative 8 from roadway south of Center Line Road
	10	Looking East from the mainland towards Alternative 8	Representative view from the Holly Beach area towards Alternative 8
	14	Looking West from South Padre Island towards Alternative 8	Representative view from South Padre Island towards Alternative 8
9	4	Looking NE from SH 100 towards Alternative 9	Representative view of Alternative 9 experienced by users of SH 100
	5	Looking West from FM 510 towards Alternative 9	Representative view of Alternative 9 experienced by residential properties and users of FM 510
	6	Looking West from Holly Beach Road towards Alternative 9	View experienced by drivers on Holly Beach Road looking towards Alternative 9
	10	Looking East from the mainland towards Alternative 9	Representative view from the Holly Beach area towards Alternative 9
	14	Looking West from South Padre Island towards Alternative 9	Representative view from South Padre Island towards Alternative 9
10	1	Looking NW towards Alternative 10 from SH 100	Representative view towards Alternative 10 from SH 100
	7	Looking North from south of Holly Beach Road towards Alternative 10	View experienced south of Holly Beach Road looking toward Alternative 10
	8	Looking South from Holly Beach area towards Alternative 10	View experienced by residential properties looking towards Alternative 10
	11	Looking East from the mainland towards Alternative 10	Representative view from the Holly Beach area towards Alternative 10
	14	Looking West from South Padre Island towards Alternative 10	Representative view from South Padre Island towards Alternative 10

Alternative	Number*	Key View	Description
11	4	Looking NE from SH 100 towards Alternative 11	Representative view of Alternative 11 experienced by users of SH 100
	5	Looking West from FM 510 towards Alternative 11	Representative view of Alternative 11 experienced by residential properties and users of FM 510
	7	Looking North from south of Holly Beach Road towards Alternative 11	View experienced south of Holly Beach Road looking toward Alternative 11
	8	Looking South from Holly Beach area towards Alternative 11	View experienced by residential properties looking towards Alternative 11
	11	Looking East from the mainland towards Alternative 11	Representative view from the Holly Beach area towards Alternative 11
	14	Looking West from South Padre Island towards Alternative 11	Representative view from South Padre Island towards Alternative 11

*Key viewpoint location number. These numbers correspond with the key view numbers in **Exhibit 4-21**
Note: Each key viewpoint is applicable to more than one reasonable alternative.
Source: HNTB 2009

The visual impact for each key view was assessed and rated according to the level of the roadway's visual impact (Low, Moderate, Moderately High and High). The visual impact levels for each key view as defined by FHWA are:

Low - Minor adverse change to the existing visual resource, with low viewer response to change in the visual environment. May or may not require mitigation.

Moderate - Moderate adverse change to the visual resource with moderate viewer response. Impact can be mitigated within five years using conventional practices.

Moderately High - Moderate adverse visual resource change with high viewer response or high adverse visual resource change with moderate viewer response. Extraordinary mitigation practices may be required. Landscape treatment required would generally take longer than five years to mitigate.

High - A high level of adverse change to the resource or a high level of viewer response to visual change such that architectural design and landscape treatment cannot mitigate the impacts. Viewer response level is high. An alternative project design may be required to avoid highly adverse impacts.

The visual assessment results are shown in **Table 4-48**.

Table 4-48: Visual Assessment

Alt.	Key Viewpoint Number*	Visual Quality - Existing Conditions			Visual Quality - With Project			Viewers Response			Resulting Visual Impact			
		Mod. Low	Avg.	Mod. High	Mod. Low	Avg.	Mod. High	Low	Mod.	High	Low	Mod.	Mod. High	High
1	1		●			●		●			●			
	2		●			●		●			●			
	3		●			●		●			●			
	10			●		●				●			●	
	12			●		●				●			●	
2	4			●		●			●			●		
	5		●			●			●			●		
	6		●			●		●			●			
	10			●		●				●			●	
	12			●		●				●			●	
3	1		●			●		●			●			
	2		●			●		●			●			
	9			●		●			●			●		
	10			●		●				●			●	
	12			●		●				●			●	
4	1		●			●		●			●			
	2		●			●		●			●			
	3		●			●		●			●			
	10			●		●				●			●	
	13			●		●				●			●	
5	4			●		●			●			●		
	5		●			●			●			●		
	6		●			●		●			●			
	10			●		●				●			●	
	13			●		●				●			●	
6	1		●			●		●			●			
	2		●			●		●			●			
	6		●			●		●			●			
	7		●			●		●			●			
	8		●			●			●			●		
	11			●		●				●			●	
	13			●		●				●			●	
7	4			●		●			●			●		
	5		●			●			●			●		
	6		●			●		●			●			
	7		●			●		●			●			
	8		●			●			●			●		
	11			●		●				●			●	
	13			●		●				●			●	

Alt.	Key Viewpoint Number**	Visual Quality - Existing Conditions			Visual Quality - With Project			Viewers Response			Resulting Visual Impact			
		Mod. Low	Avg.	Mod. High	Mod. Low	Avg.	Mod. High	Low	Mod.	High	Low	Mod.	Mod. High	High
8	1		●			●		●			●			
	2		●			●		●			●			
	3		●			●		●			●			
	10			●		●				●			●	
	14			●		●				●			●	
9	4			●		●			●			●		
	5		●			●			●			●		
	6		●			●		●			●			
	10			●		●				●			●	
	14			●		●				●			●	
10	1		●			●		●			●			
	2		●			●		●			●			
	6		●			●		●			●			
	7		●			●		●			●			
	8		●			●			●			●		
	11			●		●				●			●	
	14			●		●				●			●	
11	4			●		●			●			●		
	5		●			●			●			●		
	6		●			●		●			●			
	7		●			●		●			●			
	8		●			●			●			●		
	11			●		●				●			●	
	14			●		●				●			●	

*Key viewpoint location number, these numbers correspond with the key view numbers in **Exhibit 4-21**
Note: Each key viewpoint is applicable to more than one reasonable alternative.
Alt. - Alternative; Mod. - Moderate; Avg. – Average
Source: HNTB 2009

4.10.2.2 Analysis of Key Views

Key View #1 (Alternatives 1, 3, 4, 6, 8 and 10)
This key view is looking northwest towards Alternatives 1, 3, 4, 6, 8 and 10 from SH 100. The flat natural topography, views of undeveloped land, overhead utility lines and Buena Vista Drive exhibit an "average" visual quality. The proposed project would include paving the existing Buena Vista Drive, and the addition of new lanes, resulting in a minor change in the visual environment; therefore, there would be no change in the visual quality/character of this key view and the visual quality with Alternatives 1, 3, 4, 6, 8 and 10 would be "average". Travelers using westbound SH 100 would have short term foreground and middle ground views of the proposed new lanes and viewer awareness of the changes is likely to be low. There would be low adverse changes to Key View #1 due to the implementation of Alternatives 1, 3, 4, 6, 8 and 10.

Key View #2 (Alternatives 1, 3, 4, 6, 8 and 10)
This key view is looking east from FM 510 towards Alternatives 1, 3, 4, 6, 8 and 10. The flat natural topography, views of undeveloped land, overhead utility lines and the FM 510 and Buena Vista Drive intersection exhibit an "average" visual quality. The proposed project would include the construction of additional lanes to the north of FM 510 (Alternatives 1, 4 and 8), the paving of the existing gravel road and the construction of additional lanes to the south of FM

510 (Alternatives 1, 3, 4, 6, 8 and 10), and the construction of a new east-west roadway (Alternatives 3, 6 and 10), resulting in a minor change in the visual environment; therefore, there would be no change in the visual quality/character of this key view and the visual quality with Alternatives 1, 3, 4, 6, 8 and 10 would be "average". Travelers using eastbound FM 510 would have short term foreground and middle ground views of Alternatives 1, 3, 4, 6, 8 and 10, and viewer awareness of the changes is likely to be low. There would be low adverse changes to Key View #2 due to the implementation of Alternatives 1, 3, 4, 6, 8 and 10.

Key View #3 (Alternatives 1, 4 and 8)
This key view is looking northwest from the roadway south of Center Line Road towards Alternatives 1, 4 and 8. The flat natural topography and views of undeveloped land, shrimp farm and Center Line Road exhibit an "average" visual quality. The proposed project would include paving the existing Center Line Road and the addition of new lanes resulting in a minor change in the visual environment; therefore there would be no change in the visual quality/character of this key view and the visual quality with Alternatives 1, 4 and 8 would be "average". Travelers using the roadway south of Center Line Road would have short term foreground and middle ground views of the proposed new lanes and viewer awareness of the changes is likely to be low. There would be low adverse changes to Key View #3 due to the implementation of Alternatives 1, 4 and 8.

Key View #4 (Alternatives 2, 5, 7, 9 and 11)
This key view is looking northeast from SH 100 towards Alternatives 2, 5, 7, 9 and 11. The flat natural topography and views of undeveloped land, overhead utility lines, and a lake exhibit a "moderately high" visual quality. The proposed project would include the construction of a new roadway and would be a change in the visual environment of the landscape; therefore, there would be change in the visual quality/character of this key view and the visual quality with Alternatives 2, 5, 7, 9 and 11 would be "average". Travelers using the eastbound SH 100 would have short term foreground and middle ground views of the proposed new road and viewer awareness of the changes is likely to be moderate. There would be moderate adverse changes to Key View #4 due to the implementation of Alternatives 2, 5, 7, 9 and 11.

Key View #5 (Alternatives 2, 5, 7, 9 and 11)
This key view is looking west from FM 510 towards Alternatives 2, 5, 7, 9 and 11 and includes the representative view from the residential area in northwest Port Isabel. The flat natural topography and views of FM 510, Holly Beach Road, overhead utility lines, and undeveloped land exhibit an "average" visual quality. The proposed project would include the construction of a new roadway to the south of FM 510 and the addition of new lanes to the existing Holly Beach Road to the north of FM 510 resulting in a minor change in the visual environment; therefore, there would be no change in the visual quality/character of this key view and the visual quality with Alternatives 2, 5, 7, 9 and 11 would be "average". Travelers using westbound FM 510 would have short term foreground and middle ground views of the proposed new lanes. The view from FM 510 is located within a residential area. Community residents would have long duration foreground to middle ground views of the new lanes and would have a "moderate" sensitivity and awareness of the project and its effect on views from their homes and neighborhood. There would be moderate adverse changes to Key View #5 due to the implementation of Alternatives 2, 5, 7, 9 and 11.

Key View #6 (Alternatives 2, 5, 6, 7 9, 10 and 11)
This key view is looking west from Holly Beach Road (east-west section) towards Alternatives 2, 5, 6, 7, 9, 10 and 11. The flat natural topography and views of undeveloped land, overhead utility lines, and Holly Beach Road exhibit an "average" visual quality. The proposed project

would include the paving and addition of new lanes to the existing Holly Beach Road (north-south section) in the southern portion of this key view (Alternatives 2, 5, 7, 9 and 11), construction of a new roadway in the undeveloped area north of the existing Holly Beach Road (north-south section) in the northern portion of this key view (Alternatives 2, 5 and 9), the paving and addition of new lanes to the existing Holly Beach Road (east-west section) and the construction of a new roadway to the west of the existing Holly Beach Road (east-west section) for Alternatives 6 and 10, and the construction of a new curved roadway to connect Holly Beach Road (north-south section) with the proposed new lanes to the existing Holly Beach Road (east-west section) for Alternatives 7 and 11, resulting in a minor change in the visual environment; therefore, there would be no change in the visual quality/character of this key view and the visual quality with Alternatives 2, 5, 6, 7, 9, 10 and 11 would be "average". Travelers using westbound Holly Beach Road (east-west section) would have short term foreground and middle ground views of Alternatives 2, 5, 6, 7, 9, 10 and 11 and viewer awareness of the changes is likely to be low. There would be low adverse changes to Key View #6 due to the implementation of Alternatives 2, 5, 6, 7, 9, 10 and 11.

Key View #7 (Alternatives 6, 7, 10 and 11)
This key view is looking north from south of Holly Beach Road towards Alternatives 6, 7, 10 and 11. The flat natural topography and views of undeveloped land and overhead utility lines exhibit an "average" visual quality. The proposed project would include a new roadway and would result in a minor change in the visual environment; therefore, there would be no change in the visual quality/character of this key view and the visual quality with Alternatives 6, 7, 10 and 11 would be "average". Viewer awareness of the changes is likely to be low. There would be low adverse changes to Key View #7 due to the implementation of Alternatives 6, 7, 10 and 11.

Key View #8 (Alternatives 6, 7, 10 and 11)
This key view is looking south from residential properties in the Holly Beach area towards Alternatives 6, 7, 10 and 11. The flat natural topography and views of undeveloped land exhibit an "average" visual quality. The proposed project would include the addition of new lanes to Holly Beach Road resulting in a minor change in the visual environment; therefore, there would be no change in the visual quality/character of this key view and the visual quality with Alternatives 6, 7, 10 and 11 would be "average". The view from the Holly Beach area is located within a residential area. Community residents would have long duration foreground to middle ground views of the new lanes and would have a "moderate" sensitivity and awareness of the project and its effect on views from their homes and neighborhood. There would be moderate adverse changes to Key View #8 due to the implementation of Alternatives 6, 7, 10 and 11.

Key View #9 (Alternative 3)
This key view is looking northwest from the Holly Beach area towards Alternative 3. The flat natural topography and views of undeveloped land and the Laguna Madre exhibit a "moderately high" visual quality. The proposed project would include the construction of a new roadway and would result in a change in the visual environment; therefore, there would be a change in the visual quality/character of this key view and the visual quality with Alternative 3 would be "average". The view from the Holly Beach area is in close proximity to residential uses. Residents would have long duration background views of the new lanes and would have a "moderate" sensitivity and awareness of the project and its effect on views from their homes and neighborhood. There would be moderate adverse changes to Key View #9 due to the implementation of Alternative 3.

Key View #10 (Alternatives 1, 2, 3, 4, 5, 8 and 9)
This key view is looking east from the mainland towards Alternatives 1, 2, 3, 4, 5, 8 and 9. The view of the Laguna Madre in the foreground and South Padre island in the background exhibits a "moderately high" visual quality. The proposed project would include the construction of a new bridge resulting in a change in the visual environment; therefore, there would be a change in the visual quality/character of this key view and the visual quality with Alternative 1, 2, 3, 4, 5, 8 and 9 would be "average". Recreational users of the Holly Beach area would have long duration foreground and middle ground views of the new bridge and would have a "high" sensitivity and awareness of the project and its effect on their views. There would be moderately high adverse changes to Key View #10 due to the implementation of Alternatives 1, 2, 3, 4, 5, 8 and 9.

Key View #11 (Alternatives 6, 7, 10 and 11)
This key view is looking east from the mainland towards Alternatives 6, 7, 10 and 11. The view of the Laguna Madre in the foreground and South Padre island in the background exhibits a "moderately high" visual quality. The proposed project would include the construction of a new bridge and resulting in a change in the visual environment; therefore, there would be a change in the visual quality/character of this key view and the visual quality with Alternatives 6, 7, 10 and 11 would be "average". The view from the Holly Beach area is in close proximity to residential uses. Residents and recreational users of the Holly Beach area would have long duration foreground and middle ground views of the new bridge and would have a "high" sensitivity and awareness of the project and its effect on their views. There would be moderately high adverse changes to Key View #11 due to the implementation of Alternatives 6, 7, 10 and 11.

Key View #12 (Alternatives 1, 2 and 3)
This key view is looking west from South Padre Island towards Alternatives 1, 2 and 3. The view of the Laguna Madre in the foreground and the mainland in the background exhibits a "moderately high" visual quality. The proposed project would include the construction of a new bridge resulting in a change in the visual environment; therefore, there would be a change in the visual quality/character of this key view and the visual quality with Alternatives 1, 2 and 3 would be "average". Recreational users of the South Padre Island beach area would have long duration foreground and middle ground views of the new bridge and would have a "high" sensitivity and awareness of the project and its effect on their views. There would be moderately high adverse changes to Key View #12 due to the implementation of Alternatives 1, 2 and 3.

Key View #13 (Alternatives 4, 5, 6 and 7)
This key view is looking west from South Padre Island towards Alternatives 4, 5, 6 and 7. The view of the Laguna Madre in the foreground and the mainland in the background exhibits a "moderately high" visual quality. The proposed project would include the construction of a new bridge resulting in a change in the visual environment; therefore, there would be a change in the visual quality/character of this key view and the visual quality with Alternatives 4, 5, 6 and 7 would be "average". Recreational users of the South Padre Island beach area would have long duration foreground and middle ground views of the new bridge and would have a "high" sensitivity and awareness of the project and its effect on their views. There would be moderately high adverse changes to Key View #13 due to the implementation of Alternatives 4, 5, 6 and 7.

Key View #14 (Alternatives 8, 9, 10 and 11)
This key view is looking west from South Padre Island towards Alternatives 8, 9, 10 and 11. The view of the Laguna Madre in the foreground and the mainland in the background exhibits a "moderately high" visual quality. The proposed project would include the construction of a new bridge resulting in a change in the visual environment; therefore, there would be a change in the

visual quality/character of this key view and the visual quality with Alternatives 8, 9, 10 and 11 would be "average". The view from South Padre Island is in close proximity to residential uses. Residents and recreational users of the South Padre Island beach area would have long duration foreground and middle ground views of the new bridge and would have a "high" sensitivity and awareness of the project and its effect on their views. There would be moderately high adverse changes to Key View #14 due to the implementation of Alternatives 8, 9, 10 and 11.

4.11 CONSTRUCTION PHASE IMPACTS

The following section documents construction-related impacts related to the proposed 2nd Access Project. Because a design-build method of project delivery is anticipated, the construction techniques that would be used to build the project cannot currently be determined. Construction phase environmental impacts could vary considerably depending upon construction techniques. For this reason, it is not possible to quantify construction-phase impacts at this time. Construction techniques would be determined prior to pre-construction environmental permitting. Mitigation required for those environmental permits would, when appropriate, be based on permanent as well as construction phase impacts.

4.11.1 No-Build Alternative

The No-Build Alternative would not result in 2nd Access Project-related construction impacts.

4.11.2 Build Alternatives

During construction, short-term impacts to land uses adjacent to an alternative would occur due to the movement of workers and materials through the area, the location of temporary work spaces, and construction activities. The specific locations of the temporary work spaces are not yet known. Any land affected during construction would be restored upon completion of construction to pre-construction conditions.

Construction would occur with a defined sequence of work. Traffic control plans would be used to identify traffic detours/re-routing/road-intersection closures. Road user costs would be considered in the traffic control planning to ensure that construction activities that create high road user costs are carefully planned and completed rapidly. The construction contract specifications would address advanced notification to the public for implementation of traffic control for specific project sequences. Construction contract financial incentives could be used, if appropriate, to specifically identify timely completion milestones in order to limit and minimize the effects of the project construction phases on the public user and the environment. Construction impacts would not differ appreciably between alternatives.

4.11.2.1 Air Quality Effects from Construction

Construction phase air emissions would primarily be in the form of fugitive dust from earth moving operations and diesel emissions from heavy construction equipment. Emissions would be temporary at any specific location, would typically be distributed widely over the construction site, and are composed of relatively large sized particles. Fugitive dust from site construction activities is similar to naturally occurring wind borne dust. Although no sensitive receptors were identified in the study area, dust levels would be reduced by: 1) limiting soil disturbances to areas absolutely necessary for construction, avoiding drastic cuts, leaving as much natural vegetation as possible, stabilization of construction entrances, and wind fencing; 2) sprinkling those disturbance areas with water (more frequently under dry, windy conditions); and 3) temporary seeding followed by prompt re-vegetation/surface control measures after construction

activities are completed. Re-vegetation with native species is highly recommended, where soil and growing conditions warrant. Special care must be taken to avoid premature grading because of the difficulty of re-vegetation and the resultant potential for erosion, from both wind and water.

4.11.2.2 Noise Effects from Construction

Construction would occur as two primary activities: site preparation and roadway construction. Noise levels at any one receiver at a particular time are essentially non-predictable. Heavy machinery, the major source of construction noise, is constantly moving in unpredictable patterns. The large portion of construction activity normally occurs during daylight hours, when occasional high noise levels are more tolerable. The exposure period for any receiver would be relatively short, and extended disruption of adjacent normal activities would be included in project plans requiring the contractor to make a reasonable effort to minimize construction noise through abatement measures, such as work hour adjustments and proper maintenance of equipment muffler systems.

Underwater noise and vibrations from construction vessels and drilling or piling equipment may have negative effects on fish, benthic organisms and marine mammals. These noise and vibration effects would be short-term and dissipate once these activities cease. Noise and vibration would most likely lead to a temporary loss of habitat whereby fish and marine mammal species would simply avoid the immediate construction area due to these noises, but would return once construction related noises and vibrations cease.

4.11.2.3 Water Quality Effects from Construction

Water quality impacts are discussed in more detail in **Section 4.6**. The highest likelihood of surface water contamination at the construction site would occur from erosion and sedimentation. This would result from the removal of existing vegetation and stabilized soil at the beginning of site work, and prior to any re-vegetation or follow-up soil stabilization (such as aggregate). During this initial phase and during the construction process itself the use of temporary erosion and sediment control would reduce the potential effects and extent of erosion. Common erosion and sedimentation practices include: sandbag berms, erosion control logs, silt fences, filter dikes and hay bale berms. The use of crushed stone at access drives and specific points of egress would further reduce the amount of sediment potentially transferred off site. Temporary slope stabilization practices, such as synthetic matting would reduce sediment movement in sloped areas. The contractor would be required to exercise every reasonable precaution during construction to prevent pollution of Laguna Madre Bay and adjacent water systems, such as canals, drainages and impoundments. In accordance with TxDOT policies, a storm water pollution prevention plan would be prepared before construction of the proposed 2nd Access Project. The storm water pollution prevention plan would include temporary erosion control measures to minimize impacts to water quality during construction.

4.11.2.4 Construction Impacts on Vegetation

The Gulf prairies and barrier island beaches and dunes are highly regulated natural resources. Grading and any vegetation clearing would be minimized to the areas needed and to the extent practical within the project ROW. To the maximum extent feasible, construction would follow guidelines set forth by the USACE, Texas General Land Office and TPWD. Only those areas that need to be cleared for construction would be disturbed. In addition to direct construction impacts to vegetation and associated loss of habitat connectivity within the ROW, dust, erosion and sediment may affect adjacent vegetation communities. These impacts would be minimized

and detailed in contract specifications, where applicable, through an efficient construction schedule, appropriate use of temporary and long term Best Management Practices throughout the period of potential disturbance, and the use of water application through a mist or spray for dust control. Best Management Practices identified in construction specifications would include both temporary and permanent planting, seeding and compost manufactured top soil to enhance re-vegetation, where applicable. Reseeding and re-vegetation using native species is highly recommended, where soil and growing conditions warrant.

4.11.2.5 Threatened and Endangered Species

Ground scraping and vegetation removal are activities that can potentially affect threatened and endangered species. Marginal habitat for some of the state and federal listed species is present in the proposed project area; but no actual listed species were seen within the project limits. If listed species are found or suspected during any phase of construction, work would cease in that area and CCRMA and TxDOT personnel would be notified. TxDOT would then immediately notify the USFWS and/or TPWD of the occurrence. Work would not continue at that location until all required coordination is complete and necessary permits/clearances have been obtained. Commitments to mitigation for direct and indirect project impacts are detailed in **Section 7.0**, including mitigation for direct impacts to Piping Plover, Northern Aplomado Falcon, ocelot/jaguarundi and sea turtle habitat and indirect impacts due to traffic noise, structure lighting, habitat fragmentation, and loss of connectivity.

4.11.2.6 Pedestrian and Vehicular Safety

The contract and contract specifications, where possible, would address construction activities that may pose increased risks to pedestrians in areas located in proximity to residential and commercial areas. The introduction of a construction site to residential and commercial areas may pose safety risks associated with construction vehicles, heavy equipment, excavation hazards, flammable liquids and unfamiliar traffic patterns resulting from road closures, detours, or temporary stopped traffic. Traffic control would follow the Texas Manual for Uniform Traffic Control Devices in order to safely marshal both pedestrian and vehicular traffic. To address pedestrian safety, ample width for construction activities would be provided, proper equipment would be employed, and temporary and permanent safety fencing would be erected and maintained to preclude inadvertent access. Adequate flag persons would be used to direct traffic, as needed, and safety guidelines for equipment operations and supervisors would be identified and enforced, where applicable. Construction site access would be controlled to the extent practical for pedestrian safety. Construction activity would be scheduled during daylight hours to avoid interference with the nocturnal ocelot. Movement of vehicles and heavy machinery in the construction area would be controlled by flag persons, signs and barricades, where applicable.

4.11.2.7 Construction Equipment Impacts

Use and handling of hazardous materials associated with construction machinery/equipment would pose minimal risk to the environment, if plans, safety measures and Best Management Practices are followed. Storage of on-site hazardous materials is discouraged and any required material would be limited to small quantities and only for short-term operational needs of the site. Site storage would be limited to areas designated as low risk to the environment and would not be located in or adjacent to drainage areas. Any on-site storage would be temporary and removed when the need to support construction operations is no longer required. Temporary above-ground storage tanks containing oil and diesel, which are typically used to provide fuels for the equipment and vehicles used in roadway construction, would be regulated

and would require control measures for spills and leaks. Potential impacts could occur from small spills and leaks during fueling and maintenance of equipment and vehicles; however, these impacts should be minimal and would not pose a substantial impact to the environment. Every effort would be taken to reduce these types of impacts during the construction of the proposed project. Spill kits, which are used to absorb spills of oil, coolants, solvents, acids and bases, would also be kept on-site to properly respond to any inadvertent spills.

4.11.2.8 Construction Impacts on Soils

Roadway construction would clear and compact local soils in the project area, which may tend to increase erosion and sediment impacts along the project boundaries. Compacted soils may also limit vegetation growth. Best Management Practice measures would be implemented to minimize soil loss and transport. To the extent possible, material excavated for roadway construction would be used as fill material in other parts of the project, as needed. Additional suitable soils for construction would be used from the ROW, if available, and meet the traffic support and sub-grade technical requirements. If suitable soils cannot be found in the ROW, they would be obtained from approved commercial sites or nearby private sites that contain non-contaminated, suitable material within a reasonable haul distance from the project site.

4.12 RELATIONSHIP OF LOCAL SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

The No-Build Alternative would not result in local short-term use impacts or long-term productivity impacts associated with the construction or operation of the proposed project.

Construction of the proposed 2nd Access Project would cause limited short-term adverse effects on the environment. The short-term uses of the environment associated with the proposed reasonable alternatives are anticipated to be similar for each build alternative and are typical of those associated with highway construction. These short-term environmental concerns include construction-related noise, air quality impacts and water quality impacts. In comparison to these short-term impacts, the most evident long-term benefit of the proposed alternative alignments is the improved local and regional connectivity and improved emergency evacuation. In addition, long-term economic benefits would result from the construction of the proposed project.

4.13 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The No-Build Alternative would not result in irreversible and irretrievable commitment of resource impacts associated with the construction or operation of the proposed project.

Construction of the proposed 2nd Access Project would involve an irreversible and irretrievable commitment of resources. The commitment of land required for the proposed ROW would vary in size depending on which of the alternatives is constructed. This land includes residential and business properties, farmland, natural landscapes and wildlife habitat. Land occupied by the proposed project would be considered an irreversible commitment during the period that the land is used for a transportation facility. However, if a greater need arises for use of the land, or if the transportation facility is no longer needed, the land could be converted to another use. The natural resources required for construction includes aggregate, cement, asphalt, sand and iron ore for steel products. Once used for construction, these resources cannot be replaced as natural resources. They are not in short supply, and their use would not have an adverse effect upon the continued availability of these resources. Construction would also require an expenditure of fossil fuel. The commitment of these resources is based on the concept that

residents in the immediate area and region would benefit by the improved quality of the transportation system, project economic benefits, and improved hurricane evacuation.

4.14 AIRPORTS

4.14.1 No-Build Alternative

The No-Build Alternative would not result in airport impacts associated with the construction or operation of the proposed project.

4.14.2 Build Alternatives

The Port Isabel Cameron County Airport is located approximately 1,500 feet from Alternatives 1, 4 or 8. Filing of FAA Form 7460-1 would be required. Form 7460-1 would be completed by TxDOT prior to construction of the proposed project. The airport would then issue a Notice to Airmen once construction begins. No additional ROW would be required from the airport property and therefore, no direct impacts to the airport are anticipated.

4.15 NAVIGATION

4.15.1 No-Build Alternative

The No-Build Alternative would not result in navigational impacts associated with the construction or operation of the proposed project.

4.15.2 Build Alternatives

The proposed project would be designed to meet or exceed minimum horizontal and vertical clearance requirements as well as any other design criteria governing construction of structures over the Gulf Intracoastal Waterway; thus, no permanent impacts to navigation would be expected as a result of the proposed project. Construction activities would be planned and sequenced in a manner that would minimize disruption of traffic (including recreational boating) on the Gulf Intracoastal Waterway; thus, minimizing the potential for disruption to navigation during the construction phase.

The existing Queen Isabella Memorial Causeway is currently the only structure spanning the Gulf Intracoastal Waterway in the project area. The existing causeway has a vertical clearance of 73-feet above the mean high tide and a horizontal clearance of 275-feet (between fenders). The proposed bridge structure would be required to at least meet these requirements.

A navigation hazard risk assessment would be performed during the design phase when specific details regarding bridge length, height, and vertical/horizontal clearances are known. The USCG would be consulted during the risk assessment process.

4.16 SUMMARY OF ENVIRONMENTAL IMPACTS

Refer to **Table 4-49** for a summary of the reasonable alternatives impacts.

Table 4-49: Reasonable Alternatives Summary of Direct Impacts

Alternative	Piping Plover Habitat (acres)	Ocelot/ Jaguarundi Habitat[1] (acres)	Aplomado Falcon Habitat (acres)	Manatee and Sea Turtle Habitat (acres)	Wetlands (acres)								Land Use (acres)				
					Freshwater Pond	Forested/ Shrub	Man-made[2]	Seagrass[3]	Freshwater	Saltmarsh	Mud Flats/ Salt Flats	Open Water	Agricultural	Residential	Commercial	Undeveloped	Transportation
No-Build	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	1.03	14.48	240.40	104.29	0.84	0.00	104.77	27.61	6.25	0.00	16.67	73.01	131.10	0.00	2.09	103.00	156.45
2	13.93	4.79	168.58	104.29	0.00	0.00	41.73	27.61	38.13	0.00	17.70	73.01	53.33	31.70	0.15	142.83	122.19
3	13.93	69.75	233.95	105.02	0.00	0.00	0.00	21.40	35.32	0.00	19.80	73.64	86.70	0.00	2.08	149.99	147.80
4	13.44	14.57	240.40	113.26	0.84	0.00	104.77	41.08	6.23	2.32	13.53	71.05	131.10	0.00	2.09	96.91	132.57
5	13.44	4.79	168.58	113.26	0.00	0.00	41.73	41.08	38.11	2.32	14.56	71.05	53.33	31.70	0.15	136.74	98.31
6	13.54	107.82	248.10	112.82	0.00	0.46	0.00	40.45	11.64	2.36	13.76	70.46	91.91	0.00	2.08	146.59	130.76
7	13.54	31.99	135.50	112.82	0.00	0.00	5.32	40.45	22.26	2.36	14.79	70.46	17.47	31.70	0.15	140.75	98.69
8	0.00	13.58	240.41	76.78	0.84	0.00	104.77	47.94	6.23	0.00	5.37	72.63	131.10	17.99	2.09	64.73	74.53
9	0.00	4.79	168.59	76.78	0.84	0.00	110.08	47.94	5.98	0.00	6.21	72.63	53.33	49.68	0.15	104.57	40.26
10	0.00	119.34	247.97	72.75	0.00	0.46	0.00	43.87	11.64	0.00	5.05	68.78	91.92	17.99	2.08	114.13	72.71
11	0.00	31.99	135.52	72.75	0.00	0.00	5.32	43.87	22.26	0.00	6.08	68.78	17.47	49.69	0.15	108.30	40.64

[1]Ocelot/Jaguarundi habitat includes the total acreage of Light Brush and Dense Brush

[2]Man-made water features - shrimp farm and man-made pond next to South Padre Island Golf Club/Community

[3]Seagrass data is from a survey performed by HNTB (July 2009) - Appendix H

Table 4-49: Reasonable Alternatives Summary of Direct Impacts (continued)

Alternative	100-Year Floodplain (acres)	Displacements (total number)	Residential Proximity (acres)	Regional Geology (acres)				Vegetation Communities (acres)										Prime Farmland (acres)	Right-of-Way (acres)				Length (miles)	Estimated Total Project Cost (Millions)
				Qac	Qal	Qas	Qbr	Black Mangrove	Seacoast Bluestem-Gulfdune Paspalum	Light Brush	Dense Brush	Rangeland	Farmland	Riparian	Fence Line	Dune	Landscape		Proposed ROW	Existing ROW	Open Water	Total		
No-Build	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	$0 M
1	346.30	0	0.26	51.02	24.73	188.08	130.12	0.00	50.32	10.01	4.47	145.83	3.30	8.87	5.06	50.32	9.69	59.09	236.19	156.45	74.22	466.86	19.4	$535 M
2	359.25	2	90.63	22.19	24.73	174.42	130.12	0.00	50.32	2.89	1.90	209.18	0.00	2.09	1.36	50.32	9.69	5.10	227.97	122.19	74.22	424.38	17.4	$522 M
3	279.82	0	5.80	50.97	23.70	181.17	130.12	0.00	50.32	46.11	23.64	193.13	3.30	5.86	5.26	50.32	9.69	20.73	238.78	147.80	74.82	461.40	19.0	$534 M
4	314.48	0	0.26	51.02	40.90	188.08	84.40	0.13	0.00	10.10	4.47	152.22	3.30	8.87	5.06	28.31	9.69	59.09	230.10	132.57	72.37	435.04	18.0	$514 M
5	327.44	2	90.63	22.19	40.90	174.42	84.40	0.13	0.00	2.89	1.90	215.58	0.00	2.09	1.36	28.31	9.69	5.10	221.88	98.31	72.37	392.56	15.9	$501 M
6	236.48	0	5.79	50.61	40.04	196.97	84.40	0.13	0.00	75.47	32.35	171.94	3.30	5.60	6.45	28.31	9.69	2.72	240.59	130.76	71.84	443.19	17.6	$511 M
7	282.15	2	90.73	21.41	40.04	143.43	84.40	0.13	0.00	8.89	23.10	194.11	0.00	0.20	1.35	28.31	9.69	0.07	190.04	98.69	71.84	360.57	15.2	$493 M
8	244.84	0	37.98	51.02	23.90	188.09	31.08	0.02	0.00	9.11	4.47	112.18	3.30	8.87	5.06	0.00	10.65	59.09	220.19	74.53	70.70	365.42	15.1	$493 M
9	257.79	2	128.35	22.19	23.90	174.44	31.08	0.02	0.00	2.89	1.90	167.02	3.30	2.09	1.36	0.00	10.65	5.10	211.96	40.26	70.70	322.92	13.0	$480 M
10	162.86	0	43.51	50.61	22.87	196.97	31.08	0.02	0.00	75.47	32.35	131.66	3.30	5.60	6.45	0.00	10.65	2.72	230.39	72.71	66.51	369.61	14.4	$470 M
11	208.69	2	128.46	21.41	22.87	143.43	31.08	0.02	0.00	8.89	23.10	153.82	0.00	0.20	1.35	0.00	10.65	0.07	179.84	40.64	66.51	286.99	12.0	$452 M

Note: Residential Proximity (acres) - In addition to impacts associated with the conversion of land to ROW (such as displacements), community impacts would also occur due to proximity to the proposed facility. As a means of quantifying potential proximity impacts, the project team calculated the amount of existing and proposed residential property located outside of, but within 400 feet of, the ROW footprint for each alternative.

CHAPTER 5

INDIRECT EFFECTS

LIST OF TABLES

CHAPTER 5

INDIRECT EFFECTS

This chapter discusses the potential indirect effects of the proposed 2nd Access Project. The National Environmental Policy Act (NEPA) process and the Council on Environmental Quality's (CEQ's) regulations, implementing the procedural provisions of NEPA, are designed so as to ensure that all direct, indirect and cumulative effects of a proposed action or project that could significantly affect the quality of the environment are discussed and considered in the environmental documents. The CEQ regulations require that the proposed 2nd Access Project and other federal, state and private actions be evaluated with regard to indirect effects.

Indirect effects, as defined by CEQ's regulations, are "caused by the proposed action and occur later in time or farther removed in distance, 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" (40 Code of Federal Regulations [CFR] 1508.8). Indirect effects differ from direct impacts associated with the construction and operation of the proposed project and are caused by an action or actions that have an established relationship or connection to the proposed project. However, indirect effects can be linked to direct effects in a causal chain, which can be extended as indirect effects produce further consequences (National Cooperative Highway Research Program 2002).

Examples of indirect effects of several types of transportation projects are summarized in **Table 5-1**.

Table 5-1: Example of Indirect Effects

Project Action	Indirect Impact
Bypass Highway	Farmland converted to residential use. New residences produce new labor force attracting new businesses.
New Light Rail	New businesses open producing jobs/taxes. Traditional businesses/ residents priced out.
New Highway	Development alters character of historic area. Visitors increase to historic area.

Source: National Cooperative Highway Research Program Report 466 2002

Indirect effects often occur outside of the project right-of-way (ROW), and may include growth-inducing effects on air, water, and other natural resources. Examples of potential indirect effects of transportation projects may include the following:

- Development and land use changes due to improved access;
- Storm water runoff increases due to changes in land use and increased development on land surrounding a proposed roadway facility;
- Increased sedimentation of wetlands and streams and decreased water quality due to future development of land adjacent to a new facility;
- Loss of vegetation, wildlife habitat, and habitat connectivity, and decreased habitat value in areas of increased land development caused indirectly by improved access;
- Impact to historic or archaeological resource sites from development projects on private property that do not require cultural resource investigation because public funds or permits are not required;

- Increased use of parks and recreational areas due to more convenient access provided by a new facility;
- Stimulation of the local economy from the circulation of construction spending;
- Improved access to employment opportunities, markets, goods or services such as health and education; and
- An increased work force related to construction and developments stemming from a new facility.

Indirect effects are commonly related to changes in land use resulting from induced development. Changes in travel patterns may occur in conjunction with transportation projects, including those where tolling is involved. When a transportation project is constructed, increased access (direct effect) may make an area more attractive for development (indirect effect). Generally, it would be reasonable to expect that projects on new locations or larger scale projects would have more potential to cause indirect effects than smaller scale projects or projects being constructed in already developed areas.

The indirect effects analysis includes evaluating development and land use trends in a defined study area and projecting areas of development that may be induced by the proposed project. Analyzing the likelihood of development in a defined study area once construction is completed is a key component of evaluating the potential for indirect effects.

5.1 INDIRECT EFFECTS METHODOLOGY

Indirect effects analysis is based on requirements and processes outlined in 23 CFR 771, and guidance described in the Transportation Research Board's National Cooperative Highway Research Program *Report 466: Desk Reference for Estimating the Indirect Effect of Proposed Transportation Projects* (Transportation Research Board 2002), National Cooperative Highway Research Program *Report 25-25, Task 22*: *Forecasting Indirect Land Use Effects of Transportation Projects* (Transportation Research Board 2007), the Federal Highway Administration (FHWA) Technical Advisory 6640.8A, *Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process* (FHWA 2003), and the Texas Department of Transportation's (TxDOT's) *Guidance on Preparing Indirect and Cumulative Impact Analyses* (TxDOT 2010).

This indirect effects analysis utilizes a seven-step process to identify potential indirect effects. The seven-step process (**Table 5-2**) was adapted from the method set forth in National Cooperative Highway Research Program Report 466.

Table 5-2: Seven-Step Approach to Estimate Indirect Effects

Step No.	Step
1	Scoping
2	Identify the Study Area's Goals and Trends
3	Inventory the Study Area's Notable Features
4	Identify Impact-Causing Activities of Proposed Action and Alternatives
5	Identify Potentially Substantial Indirect Effects for Analysis
6	Analyze Indirect Effects and Evaluate Results
7	Assess Consequences and Consider/Develop Mitigation

Source: TxDOT 2009

The seven-step process serves as the basic approach for this indirect effects analysis. The primary resource was the *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009) prepared for the Cameron County Regional Mobility Authority (CCRMA). This report incorporates decennial census data; population projections; stakeholder interviews; expert surveys; demographic, economic and employment forecasts; and Mexican border influences.

A geographic information system-based analysis was used to quantify the data gathered. Given the nature of indirect effects, it must be stated that the analysis primarily relies upon projected data. Anticipated demographic trends, travel demands, and recognized development trends, were used during the analysis.

5.1.1 Step 1: Scoping

Scoping is a process used to determine the extent of the analysis needed and to define the study area. The scoping process has two overall goals: (1) determining the level of effort and approach needed to complete the analysis, and (2) determining the location and extent of the indirect effects area of influence. The scoping process for the indirect effects analysis included meetings with local city and county officials, as well as federal and state agency representatives. Discussion topics included existing development, proposed development, relation to proposed project and development patterns/trends. Agency and community stakeholders and regional, county and city land use planning authorities were engaged in the project from the early planning stages to determine the likelihood of indirect and cumulative impacts from the proposed project. To determine the extent of potential induced development, city and county land use planning authorities in the study area were consulted in 2007, 2008 and 2009. Planners and planning experts were asked to give their opinions on the percentage of planned growth dependent on the proposed 2nd Access Project, and if possible, provide information on the size and location of this growth. A full list of stakeholders involved in the project is included in the Project Coordination Plan **(Appendix I)**. **Table 5-3** includes a summary of project stakeholders.

Table 5-3: Project Stakeholders and Planning Authorities

Community Level	Agency Level
Elected Officials Local – Council Members, County Officials and Mayors	Local Private – Utility companies, Railroads, Industries Public – Counties, Municipalities, CCRMA
	State State – Texas Commission on Environmental Quality (TCEQ), TxDOT, Texas Historical Commission (THC), Texas Parks and Wildlife Department (TPWD), Texas General Land Office
	Federal FHWA, U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries), Natural Resources Conservation Service (NRCS), U.S. Environmental Protection Agency (EPA)

Adjacent census tracts were utilized as the study area in the development of the economic analysis presented in the *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009). Quantitative and qualitative data from TXP's economic analysis was heavily relied upon throughout the indirect effects analysis because the study provided important insights for understanding current trends as well as potential future outcomes and scenarios specific to land planning, economic development, and tourism. Because TXP's economic analysis is considered a regional analysis related to transportation planning, the study area used in TXP's economic analysis is sufficiently large to capture regional economic development associated with the proposed improvements. Additionally, the use of census tracts is an acceptable use of geographic boundaries to define the indirect effects area of influence, as per NCHRP Report 466. Therefore, adjacent census tracts were utilized to define the indirect effects area of influence.

The indirect effects area of influence falls entirely within Cameron County and includes unincorporated areas, such as Laguna Heights, as well as the City of Port Isabel, the City of South Padre Island, the Town of Laguna Vista, the Town of Bayview, and the southern portion of the Laguna Madre. The indirect effects area of influence includes the area in which the proposed 2nd Access Project could influence local traffic patterns or land development. The indirect effects area of influence consists of approximately 233,205.6 acres, as shown in **Exhibit 5-1**. Indirect effects from the proposed project are analyzed through 2045, which is consistent with the *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009).

5.1.2 Step 2: Identify the Study Area's Goals and Trends

The proposed 2nd Access Project is within a mostly rural area with an established agricultural presence. Development within the indirect effects area of influence is increasing, and there are hundreds of acres of land available for development on the mainland and on the island. The Town of Laguna Vista has experienced the greatest increase in population and is currently implementing a strategy for commercial development. Growth of the City of Port Isabel, however, is constrained by the limited amount of developable land within its city limits. South Padre Island has and continues to experience growth through land development, tourism and redevelopment of existing areas. However, higher property values on the island are inhibiting commercial development; therefore, the focus of future commercial development is on the mainland (TXP, Inc. 2009).

The Town of Laguna Vista and the City of South Padre Island increased by 43.8 percent and 44.2 percent, respectively, between 1990 and 2000, and an additional 139.5 percent and 17.3 percent, respectively, during the past eight years. In 2007, the population of the Town of Laguna Vista surpassed that of the City of South Padre Island (TXP, Inc. 2009). Future growth on the mainland within the indirect effects area of influence is regulated by Cameron County, the City of Port Isabel and the Town of Laguna Vista.

Tourism, documented accommodation and food services as well as retail trade, is the major industry within the indirect effects area of influence. Out-of-town visitors, winter Texans and shoppers from Mexico spend millions of dollars at local hotels, restaurants and retail facilities each year. Economic development officials within the area indicate that tourism retention and expansion are the focal points of local efforts (TXP, Inc. 2009).

The unincorporated community of Laguna Heights does not have a formal municipal government directing land uses or providing services to residents; however, and as discussed in

Chapter 3, none of the 11 reasonable alternatives traverse the boundaries of the Laguna Heights. Moreover, an additional access bridge to South Padre Island would provide workers who live in Laguna Heights an alternative option for traveling to work on the island, and because the proposed 2nd Access to South Padre Island would likely shift some regional traffic away from using the Queen Isabella Causeway to the proposed facility, commute times may be reduced for those workers using the Queen Isabella Causeway with the anticipated overall improved mobility and accessibility and lessened congestion. As such, it is not anticipated that the 2nd Access Project would have a substantial direct and indirect impact on this community; therefore, no further discussion is warranted.

5.1.2.1 City of Port Isabel

In 1980, the City of Port Isabel had a population of 3,769 (U.S. Census Bureau (USCB) 1980). By 1990, the population had grown to 4,467, an 18.5 increase, and by 2000 the population had reached 5,018, an additional 12.3 percent increase over 1990 (USCB 1990 and 2000). Over the past 8 years, the population of Port Isabel has increased to by another 5.4 percent to 5,290 residents.

The *City of Port Isabel Comprehensive Plan, Planning Period 2005-2015* (City of Port Isabel 2005), as discussed in **Chapter 3**, aims to promote development within the city limits and extra-territorial jurisdiction in an effort to attract residents, visitors, and desirable commercial investments. However, Port Isabel has very little available land within its city limits to expand its economic enterprises and housing stock; thus, growth and economic development opportunities within the City of Port Isabel are limited (Cross Border Institute for Regional Development 2005).

5.1.2.2 Town of Bayview

The Town of Bayview is the least populated incorporated community in the area of influence, but experienced the highest population growth from 2000 to 2007 (28.5 percent). The community does not have a formal community plan, but does retain a legacy of land use and architectural controls that preserve its rural estate and agricultural heritage. The Town of Bayview's Zoning Ordinance requires minimum lot sizes of 1.5 acres and minimum single-family home sizes of 2,000 square feet, which indicates the Town's plan to retain its rural character. According to the Mayor, the majority of Town of Bayview residents oppose commercial development within the community.

5.1.2.3 Town of Laguna Vista

The Town of Laguna Vista does not have an adopted comprehensive plan; however, town officials created the Laguna Vista Commercial Development Task Force. The task force drafted a commercial development strategy that describes methods for attracting business development and recommends making changes to land use and zoning codes to accommodate business development. Additionally, the task force identified lands with development potential, which are generally located adjacent to Santa Isabel Boulevard between Broadway Boulevard and State Highway (SH) 100 and along SH 100 at the intersection with Santa Isabel Boulevard.

The *Town of Laguna Vista's Strategy for Commercial Development* (Town of Laguna Vista 2008) seeks to attract new business ventures needed in the community, and includes maps of potential business real estate. The Strategy outlines commercial development plans under consideration for adoption, and recommends development of a "Smart Growth" Plan. Potential annexation of land in the current Laguna Vista extra-territorial jurisdiction is also presented, along with blocking annexation by nearby Brownsville, measures which are consistent with

planning for growth.

5.1.2.4 City of Brownsville

The economic goals of the City of Brownsville, as articulated in the *Imagine! Brownsville: Brownsville Comprehensive Plan* (City of Brownsville 2008) include a robust growing economy, consistent net growth in quality jobs, affordable commercial utility and tax rates, and low production costs. The Plan includes both private and public sector plans for mitigating risks and guaranteeing profits for prospective businesses, in order to recruit new employers to the area.

5.1.2.5 City of South Padre Island

Future growth on South Padre Island within the indirect effects area of influence is regulated by the City of South Padre Island. The *Town of South Padre Island, Texas, Comprehensive Plan* (Town of South Padre Island 2008) outlines goals and recommendations for the City of South Padre Island and its extra-territorial jurisdiction related to land use (*e.g.,* economic development) and transportation infrastructure, including specific reference to the proposed 2nd Access Project. The "Vision Statement" for the City of South Padre Island in the year 2020 states:

> "A second causeway has been constructed providing an alternative link to the mainland and improved egress for emergency evacuation. The new causeway respects the delicate ecological balance and recreational functions of the Laguna Madre. The design of the causeway and its approach to the island provides a distinctive image as an entry feature or gateway" (Town of South Padre Island 2008).

The stated intent of the *Town of South Padre Island Comprehensive Plan* (Town of South Padre Island 2008) is to neither stop nor accelerate growth, but instead to accommodate already foreseeable growth and maximize the associated economic development opportunities in a way that does not jeopardize social or ecological systems. The Plan acknowledges that foreseeable growth is substantial enough to potentially exacerbate existing problems well before 2025, if not adequately managed.

Chapter 4, "Mobility", of the *Town of South Padre Island, Texas, Comprehensive Plan* (Town of South Padre Island 2008) includes specific information regarding the critical status of a second causeway for the future of the City of South Padre Island. This plan states that the only island location that would serve the current and future needs of the town is north of the existing South Padre Island Convention and Visitor's Bureau.

The *South Padre Island Birding Master Plan* (Shiner Moseley and Associates, Inc. 1999) describes the specifics of South Padre Island's limited acquisitions, visitor amenities, selective habitat enhancement, and focused promotion to develop South Padre Island into one of the premier birding locations in the western hemisphere. The *South Padre Island Master Park Plan* (Langford Community Management Services 2006), which encompasses the *South Padre Island Birding Master Plan*, establishes goals that form the basis of the Parks and Recreation system on South Padre Island. The overriding goal of the plan, which was prepared at the request of the Economic Development Corporation, is to develop the island as a major nature and birding center, as well as to capitalize on the prime location of the island to serve as a base from which to visit internationally known birding sites throughout the Rio Grande Valley on a series of day trips. Over the past 10 years, the Town Aldermen and Economic Development Corporation have been actively planning and implementing projects to provide more than a "Spring Break" attitude regarding South Padre Island. Essentially, it is the goal of the City of

South Padre Island to capitalize on the existing tourism infrastructure to promote ecotourism (e.g., world class birding at a world class island resort).

5.1.2.6 Other Goals and Trends within the Indirect Effects Area of Influence

Other goals for the study area include developing "regional solutions for improving the transportation infrastructure and economic development in Cameron County" (CCRMA 2006). On June 22, 2004, the Cameron County Commissioners Court authorized the County Judge to file a petition to the Texas Transportation Commission to create a Regional Mobility Authority for the Cameron County area, which was approved by the Texas Transportation Commission on September 30, 2004. The Commissioners Court formally approved the conditions set forth by the CCRMA and subsequently appointed the Directors of the CCRMA. The CCRMA was established to assist the citizens of South Texas in providing congestion relief, traffic safety, enhanced mobility and viable alternative routes in the rapidly growing Rio Grande Valley area.

The *Cameron County Regional Mobility Authority Strategic Plan, 2007-2011* (CCRMA 2006) establishes the basic framework toward the CCRMA's mission of developing regional solutions for improving the transportation infrastructure and economic development in Cameron County. The CCRMA works with the numerous cities in Cameron County, as well as the State of Tamaulipas, Mexico, to construct projects at a much more rapid pace than would normally occur. The CCRMA works very closely with TxDOT on several on-going projects in Cameron County. The initial projects that were submitted with the CCRMA application to the Texas Transportation Commission were the West Loop (West Parkway) project in the City of Brownsville and the proposed 2nd Access Project.

The Laguna Atascosa National Wildlife Refuge has plans for expansion within the proposed 2nd Access Project's indirect effects area of influence. The *Laguna Atascosa National Wildlife Refuge Proposed Refuge Expansion Plan, Environmental Assessment and Conceptual Management Plan* (USFWS 1999a) identifies lands proposed for acquisition by the USFWS. These include properties on the mainland west from the present refuge to Farm-to-Market Road (FM) 1847, south to the Brownsville Ship Channel, and east to the Laguna Madre. Properties on South Padre Island include all land from the north end of Park Road 100 to the Mansfield Cut. Other properties include the land along the shores of the Arroyo Colorado from the current refuge to the Port of Harlingen.

5.1.3 Step 3: Inventory the Study Area's Notable Features

The baseline conditions for environmental resources that exist before project construction are included in **Chapter 3** of this document. Resources/issues analyzed include land use, socioeconomics, noise, climate and air quality, geology and soils, water resources, ecological resources, Section 4(f) resources (parks and historic properties), hazardous materials, and visual and aesthetic qualities.

Notable features (NF) within the indirect effects area of influence that could be indirectly impacted by the proposed 2nd Access Project include sensitive species and habitats, including threatened and endangered species habitat, colonial waterbird rookeries and seagrasses; and valued environmental components, including essential fish habitat, prime farmland, National Wildlife Refuges, public parks and Coastal Barrier Resources Act lands. Notable features within the indirect effects area of influence are listed in **Table 5-4** and shown in **Exhibit 5-2**.

Table 5-4: Notable Features Within the Indirect Effects Area of Influence

Resource ID	Notable Feature
NF-1	Threatened and endangered species habitat, including ocelot and jaguarundi habitat on the mainland, Northern Aplomado Falcon habitat on the mainland, Piping Plover USFWS -designated critical habitat on South Padre Island and the mainland, West Indian manatee habitat within the Laguna Madre, and sea turtle habitat within the Laguna Madre and Gulf Side beaches of South Padre Island
NF-2	Colonial waterbird rookeries on spoil islands within the Laguna Madre
NF-3	Seagrasses within the Laguna Madre
NF-4	Essential fish habitat
NF-5	Prime farmland on the mainland
NF-6	National wildlife refuges on the mainland
NF-7	Public parks on South Padre Island
NF-8	Coastal Barrier Resources Act lands

Source: HNTB (2009)

5.1.3.1 Sensitive Species and Habitats

NF-1 Threatened and Endangered Species Habitat

The ocelot and jaguarundi are federal and state listed endangered species. The ocelot and jaguarundi inhabit dense, almost impenetrable chaparral thickets, mesquite scrub and live oak motts. There are approximately 48,091.3 acres of suitable ocelot and jaguarundi habitat within the indirect effects area of influence on the mainland. Additionally, historical records for the U.S. indicate that the ocelot once occurred throughout South Texas, the southern Edwards Plateau and along the Coastal Plain; currently, the ocelot is found in South Texas brush country and the Rio Grande Valley. There are 13 known resident ocelots on and around the Laguna Atascosa National Wildlife Refuge (Sternberg and Mays 2011). In addition, the TPWD Natural Diversity Database reports six known occurrences of the ocelot within the indirect effects area of influence, but outside the refuge property (TPWD 2009j). Consultations with the USFWS have resulted in the identification of numerous ocelot travel corridors in the project area.

The Piping Plover, a state and federally listed threatened species, is a winter migrant along the Texas Gulf Coast and is found on beaches and bayside mud and salt flats. In order to help revive the population, critical habitat has been designated by the USFWS on the Gulf Coast and ranges from Florida to Texas. There are approximately 12,091.6 acres of designated Piping Plover critical habitat within the indirect effects area of influence. Approximately 11,701.4 acres of estuarine mudflat not designated as Piping Plover critical habitat also occurs within the indirect effects area of influence.

The Northern Aplomado Falcon is both a federal and state listed endangered species. It inhabits the open country, such as savannas, open woodlands, grassy plains and valleys with scattered mesquite, yucca and cacti. The falcon nests in old stick nests of other bird species. There have been successful efforts to reintroduce the Northern Aplomado Falcon into Laguna Atascosa National Wildlife Refuge in Cameron County. There are approximately 89,327.3 acres of appropriate habitat for this species within the indirect effects area of influence.

Three state and federally listed threatened and endangered sea turtles have potential habitat within the indirect effects area of influence, including the green sea turtle, hawksbill sea turtle, and Kemp's ridley sea turtle. These sea turtle species are known to occur in the waters of the Laguna Madre, as well as nest on the Gulf side beaches of South Padre Island. There are approximately 108,457.3 acres of foraging habitat (i.e., the Laguna Madre) within the indirect effects area of influence, as well as approximately 527.6 acres of nesting habitat on Gulf beaches within the indirect effects area of influence.

The West Indian manatee is a federal and state listed endangered species. This species inhabits the gulf and bay system, and is an opportunistic aquatic herbivore. The manatee is extremely rare in Texas, but was once common in the Laguna Madre. The manatee inhabits salt and fresh water and feeds on submergent vegetation, predominantly seagrasses in saltwater habitats (Schmidly 2004). There are approximately 108,457.3 acres of appropriate habitat (i.e., the Laguna Madre) within the indirect effects area of influence.

NF-2 Colonial Waterbird Rookeries

The deposition of dredged spoil, resulting from the construction and maintenance of the Gulf Intracoastal Waterway, has provided artificial nesting habitats for colonial waterbirds. These spoil islands are adjacent to shallow and open waters teeming with fish and crustaceans and function as rookeries for colonial waterbirds. The General Land Office, in cooperation with the TPWD, USFWS, the Texas Audubon Society and the Texas Colonial Waterbird Society, has identified colonial waterbird rookery areas in the Texas coastal counties and bays. The USFWS Texas Coastal Program protects and manages habitat for colonial waterbird on island rookeries and acts to minimize human disturbance for beach-dependent birds.

There are three colonial waterbird rookeries totaling approximately 6,547.0 acres within the indirect effects area of influence: (1) Laguna Vista Spoil colonial waterbird rookery, (2) Port Isabel Spoils colonial waterbird rookery, and (3) Three Island Spoil colonial waterbird rookery.

NF-3 Seagrasses

Submerged seagrass meadows are a dominant, unique subtropical habitat in many Texas bays and estuaries. Most seagrass meadows in Texas are found within the Laguna Madre, and most areas are state-owned. These meadows play critical roles in the coastal environment by providing nursery habitat for estuarine fishes, organic biomass for coastal food webs, effective natural agents for stabilizing coastal erosion and sedimentation, and major biological agents in nutrient cycling and water quality processes (Withers 2002). Seagrass also provides habitat for sea turtles, providing the primary food source for green and hawksbill turtles (Tunnell, Judd and Bartlett 2002). There are approximately 69,979.9 acres of seagrass beds within the indirect effects area of influence. Preventing the loss of this habitat is of utmost importance to federal and state agencies, including the USFWS, NOAA Fisheries and TPWD.

5.1.3.2 Valued Environmental Components

NF-4 Essential Fish Habitat

Essential fish habitats are designated by the National Oceanic and Atmospheric Administration, NOAA Fisheries and Gulf of Mexico Fisheries Management Council. The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) is the federal regulation that governs U.S. marine fisheries management. In 1996, Congress amended the Magnuson-Stevens Act and mandated the identification of essential fish habitat for managed species, as well as measures to conserve and enhance the habitat necessary for fish to carry out their life cycles. Essential fish habitat is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). The Laguna Madre portion of the indirect effects area of influence, which comprises approximately 108,457.3 acres, is entirely essential fish habitat.

NF-5 Prime Farmland

The Farmland Protection Policy Act, as detailed in Subtitle I of Title XV of the Agricultural and Food Act of 1981, provides protection to prime and unique farmlands, as well as farmlands of statewide or local importance. Prime farmland soils, as defined by the United States

Department of Agriculture, are soils that are best suited to producing food, feed, forage and oilseed crops. Such soils have properties that are favorable for the production of sustained high yields. Prime farmland soils occupy approximately 16,338.4 acres within the indirect effects area of influence on the mainland. Although the Farmland Protection Policy Act provides protection to this resource, its protection is limited to Federal programs. It is expected that most of the induced development would occur as a result of private development. With regard to private development, prime farmlands would not be protected under the Farmland Protection Policy Act.

NF-6 National Wildlife Refuges

National wildlife refuges are managed by the USFWS. Approximately 32,368.3 acres of land within the indirect effects area of influence on the mainland are included in the National Wildlife Refuge System and are under the jurisdiction of the USFWS. The Laguna Atascosa National Wildlife Refuge is located in the northern portion of the indirect effects area of influence and the Lower Rio Grande Valley National Wildlife Refuge is located in the southern portion of the indirect effects area of influence. Because of the relatively undeveloped nature of the mainland in the region, the USFWS is attempting to provide a connection between these two National Wildlife Refuges by linking these undeveloped lands. This connection would provide a wildlife corridor for the endangered ocelot and other wildlife.

NF-7 Public Parks

There are several public parks and recreation areas within the indirect effects area of influence, totaling approximately 365.9 acres. Existing park facilities on South Padre Island include Water Tower Park, Isla Blanca Park, Andy Bowie Park, and E.K. Atwood Park. Existing park facilities on the mainland include Village Park and Laguna Vista Park in Laguna Vista, and Washington Park, Lighthouse Park, and Texas State Park in the Town of Port Isabel.

NF-8 Coastal Barrier Resources Act Lands

Within the indirect effects area of influence there are approximately 19,055.1 acres of lands that are designated under the Coastal Barrier Resources Act. In general, the Coastal Barrier Resources Act lands located on South Padre Island are found in Andy Bowie Park and lands north of the project area. Congress passed the Coastal Barrier Resources Act on October 18, 1982 to minimize the loss of human life, the wasteful expenditure of Federal revenues, and damage to the natural and other resources of coastal barrier systems along the Atlantic and Gulf coasts. The statute placed restrictions on the expenditure of Federal funds for developmental activities. Specifically, Section 5 of the Coastal Barrier Resources Act prohibits new expenditures for highway projects occurring within the boundaries of designated Coastal Barrier Resources Act lands.

5.1.4 Step 4: Identify Impact-Causing Activities of the Proposed Action and Alternatives

The proposed project would extend from SH 100 on the mainland to Park Road 100 on South Padre Island. The proposed 2nd Access Project consists of three major components: the mainland roadways, the Laguna Madre crossing and the island roadway. Tolling is proposed for the bridge and bridge approaches. Controlled access is proposed within the limits of tolling; outside the limits of tolling, the project would be non-controlled access. Impact-causing activities include all of the activities involved in construction, operation and maintenance of the proposed facility. Impact-causing activities associated with the proposed project are described in **Table 5-5**.

Table 5-5: Impact-Causing Activities

Type of Activity	Project-Specific Activity	Relevant Details
Modification of Regime	Exotic Flora Introduction	Spread and establishment of nonnative invasive vegetation species into previously undisturbed areas could result from the proposed project. Executive Order 13112 on Invasive Species and the Executive Memorandum on Beneficial Landscaping are designed to prevent this impact.
	Modification of Habitat	Loss of vegetation (201.60 acres to 409.03 acres (depending on alternative) and habitat fragmentation would occur during construction and operation of the proposed project. Direct impacts to terrestrial wildlife (between 139.69 and 291.81 acres, depending on alternative) would include the loss of habitat (light brush, dense brush, rangeland, riparian and fence line) as it is converted to ROW, as well as the resulting fragmentation of habitat patches. Direct impacts to seagrasses would include the removal of individual plants during the placement of pilings, and increased suspended sediments due to sediment disturbing activities. Direct impacts to seagrasses would total between 21.40 acres and 47.94 acres, depending on alternative. Direct impacts to wetlands (forested/shrub, freshwater and mud flats/salt flats) would include the placement of fill materials in 11.6 to 55.8 acres of existing wetlands, depending on alternative. Potential impacts to essential fish habitat from activities associated with the construction, operation, and maintenance of the proposed project may result from temporary degradation of water quality (sedimentation and turbidity) as well as direct impact from the installation of bridge supports and their foundations on the seafloor (loss of sandy bottom and seagrass habitat and the creation of water column structures). Other impacts that may result from the construction of the proposed project include effects from noise, mortality, and displacement of terrestrial wildlife, fish and benthic organisms.
	Alteration of Ground Cover	The primary impacts to existing ground cover (i.e., vegetation) would be a result of site preparation and construction of the proposed project, and would include the removal of existing vegetation from the ROW and any disturbance resulting from construction staging areas. Best management practices would be in place to control soil erosion.
	Alteration of Drainage	As the topography and vegetation are altered, hydrologic conditions associated with runoff and drainage flow would also change, although appropriate design measures would minimize these impacts.
Land Transformation and Construction	New Transportation Facility	The proposed 2nd Access Project consists of three major components: the mainland roadways, the Laguna Madre crossing bridge, and the island landing.
	Service or Support Sites and Buildings	No service or support sites/buildings are anticipated.
	Noise and Vibration	During construction of the proposed project, underwater noise and acoustics from construction vessels and drilling or piling equipment may have negative effects on fish and benthic organisms (Hastings and Popper 2005), as well as marine mammals (e.g. bottlenose dolphins). These noise and acoustical effects would be short-term and dissipate once

Type of Activity	Project-Specific Activity	Relevant Details
		these activities cease. Noise and vibration would most likely lead to a temporary loss of habitat whereby fish and marine mammal species would simply avoid the immediate construction area due to these noises/vibrations, but would return once construction related noises cease.
	Cut and Fill	The proposed 2nd Access Project requires permanent structural fills (bridge abutments, bridge columns); no design-feature permanent cuts are required.
Resource Extraction	Surface Excavation	Land clearing during construction activities would remove vegetative cover and may increase surface runoff during storm events and could lead to erosion. Clearing would be minimized to the extent practicable.
Processing	Product Storage	The location of contractor's field office and storage site has not been determined. If the contractor chooses to use undeveloped land for material storage, impacts to natural resources may increase.
Land Alteration	Erosion Control	The use of temporary erosion and sediment control would reduce the potential effects and extent of erosion. Common erosion and sedimentation practices include: sandbag berms, silt fences, filter dikes and hay bale berms. The use of crushed stone at access drives and specific points of egress would further reduce the amount of sediment potentially transferred off site. Temporary slope stabilization practices, such as synthetic matting would reduce sediment movement in sloped areas. A storm water pollution prevention plan would be prepared before construction of the proposed 2nd Access Project. Erosion control logs would be utilized during construction. Soil erosion and sedimentation would be minimized by the use, where practicable and feasible, of a combination of any of the following generally recommended methods. Other best management practices not specifically identified below may be appropriate to address unanticipated site conditions: - Limit the surface area of unprotected, erodible soil exposed to erosion at any one time during construction activities. Stage clearing of vegetation as needed to keep pace with construction, rather than clearing far in advance. - Upgrade unstable ground underlying the proposed action by means of various engineering activities: o The addition of extra sub-base materials to buffer the paved roadway from effects of shrinking and swelling ground; o Lime-stabilization; and o Avoidance of cut or fill slopes greater than ten degrees. Where such slopes are unavoidable, other means of protection may be required such as geotechnical fabrics, reduction of top-slope loads, and/or shoring of the toe of the slopes. - Revegetate disturbed areas as soon as possible using nature's seasonal cycles to an advantage. - Use native plant species, particularly long-lived, rapid growing species requiring a minimum of maintenance. Weedy species such as King Ranch bluestem and buffelgrass should not be used as they become invasive to natural areas outside the ROW. - Limit duration of exposure of soils to erosion to the shortest possible time.

Type of Activity	Project-Specific Activity	Relevant Details
		- Stage mulching and seeding to closely follow the progression of construction operations, particularly on high cuts and fills. - Protect native vegetative cover (where active construction is not required) from equipment traffic and personnel parking. Natural vegetative areas not destined for active construction should be clearly marked as equipment-free areas. All construction personnel should be clearly instructed in the identification and restricted use of equipment-free areas. - Coordinate construction activities to provide the least interference with agriculture operations. - Reduce volume and velocity of construction runoff. - Utilize temporary slope drains to carry runoff from cuts and embankments to the bottom of slopes. - Complete permanent drains and slope protection at the earliest practical time. - Stabilize permanent soil berms by placing rock rubble on the downslope side, further reducing loss of soil moisture. - Mulch and/or chipped vegetation may be used to reduce soil erosion on slopes, newly constructed embankments, and revegetated areas. Temporary and permanent erosion control measures would be coordinated to ensure the best possible control during the construction and post-construction period. Permanent erosion control features would be installed at the earliest practicable time.
	Landscaping	Unpaved disturbed areas within the ROW and staging areas would be revegetated. Best management practices call for seeding or sodding of disturbed areas. Reseeding and re-vegetation using native species is highly recommended, where soil and growing conditions warrant.
	Wetland Fill and Drainage	Construction activities that fill wetlands would alter the ecological and hydrological values and functions of those wetlands. The clearing of vegetation and the filling of wetlands would result in a permanent loss of wetland wildlife habitat.
	Fill into Open Waters	Land clearing during construction activities would remove vegetative cover and may increase surface runoff during storm events and could lead to erosion. If runoff is allowed to flow into water bodies without erosion and sediment control measures, increased turbidity and sedimentation may modify water chemistry due to elevated levels of sediments, nutrients and pollutants. Changes in water chemistry could diminish suitable habitat for aquatic species, including littoral zone plants, and alter wetland functions and values.
Resource Renewal	Hazardous Materials Handling and Storage	Storage and use of hazardous materials would be necessary during the construction of the proposed project. Activities dealing with the use and storage of hazardous materials during roadway construction would be required to conform to TxDOT standards for spill containment and control strategies.
	Site Remediation	ROW acquisition would be required for the recommended preferred alternative. Prior to ROW negotiation and/or acquisition, a limited American Society for Testing and Materials Phase I Environmental Site Assessment would need to be conducted for the recommended preferred alternative. A Phase II Environmental Site Assessment may also be necessary depending on the findings of the Phase I Environmental Site Assessment. The Phase II Environmental Site Assessment would provide additional testing and

Type of Activity	Project-Specific Activity	Relevant Details
		sampling of all potential hazardous sites and would include a remediation plan, if warranted.
Changes in Traffic	Transit (Bus)	The proposed project would increase access for transit operations between the mainland and South Padre Island. This increase in transit operations would increase the opportunity to utilize alternative means of transportation, and thus further help congestion reduction in the area.
	Automobile	The proposed project would provide an alternate access to South Padre Island, thereby decreasing congestion in the City of Port Isabel as well as on the south end of the City of South Padre Island. It is anticipated that visitors from the north of the study area would utilize this alternate access.
	Trucking	The proposed project would provide an alternate access to South Padre Island, thereby decreasing congestion in the City of Port Isabel as well as on the south end of the City of South Padre Island. Additionally, the additional access point would allow truck traffic to enter South Padre Island closer to central and northern island destinations, which would decrease congestion on South Padre Boulevard.
	Pleasure Boating	Additional marinas potentially constructed (as part of induced growth) would potentially provide access to previously inaccessible reaches of the Laguna Madre.
	Operational or Service Charge	The anticipated 2nd Access Project toll rate is 15 - 20 cents per mile. The Queen Isabella Memorial Causeway would continue to provide a non-toll option for commuting between the mainland and South Padre Island for motorists.
Waste Emplacement and Treatment	Emplacement of Soil and Overburden	Soil excavated from the project area would potentially be stockpiled for re-use on this project, depending on the results of soil testing.
	Sanitary Waste	The contractor, when selected, would be required to provide portable sanitary facilities for employees at the field office.
Chemical Treatment	Fertilization	Fertilizers may be used during revegetation, which could result in decreased water quality (e.g., increased nitrogen) due to runoff. Excess nitrogen in water bodies has been shown to reduce oxygen concentration and impact aquatic populations.
	Weed Control	Periodic applications of herbicides may be used during the maintenance phase of the proposed project, which could result in decreased water quality due to runoff. Additionally, there could be indirect impacts to sensitive species from the application of herbicides. However, beneficial indirect impacts could result from the removal of noxious weed populations, thereby increasing the availability of habitat for sensitive species. There could also be beneficial impacts to wildlife species by limiting the negative impacts of noxious weeds on native species.
	Pest Control	Periodic applications of pesticides may be used during the maintenance phase of the proposed project, which could result in decreased water quality due to runoff.
Access Alteration	New or Expanded Access to Activity Center	The proposed 2nd Access Project would provide an additional point of access to South Padre Island.
	New Or Expanded Access to Undeveloped Land	The proposed 2nd Access Project would enhance access to currently undeveloped land.
	Alter Travel Circulation Patterns	Many of the vehicle trips bound for South Padre Island that currently rely on the Queen Isabella Memorial Causeway would have a convenient alternative in the proposed 2nd Access Project, especially those trips that originate from the

Type of Activity	Project-Specific Activity	Relevant Details
		City of Harlingen and the towns or communities located to the north. The result would be reduced traffic congestion in Port Isabel and on the island and improved traffic circulation on the island, as well as improved emergency evacuation from the island.
	Alter Travel Times between Major Trip Productions and Attractions	The reduction of traffic congestion would reduce and improve the reliability of travel times to local events and between local attractions.
	Alter Travel Costs between Major Trip Productions and Attractions	The proposed 2nd Access Project could be a tolled facility; therefore, there would be an increase in travel costs associated with travel between the mainland and the island. However, efficiencies associated with shorter, more direct, less congestion route may actually off-set cost of tolls. Moreover, the existing Queen Isabella Memorial Causeway would continue to be an untolled option for travel between the mainland and South Padre Island.

Sources: National Cooperative Highway Research Program Report 466 2002; HNTB 2009

5.1.5 Step 5: Identify Potentially Substantial Indirect Effects for Analysis

There are three broad categories of indirect effects (National Cooperative Highway Research Program 2002):

1. Encroachment-Alteration Effects: Alteration of the behavior and functioning of the affected environment caused by project encroachment (physical, chemical, biological) on the environment.
2. Induced Growth Effects: Project-influenced development effects from development of undeveloped land or redevelopment to more intensive uses.
3. Effects Related to Induced Growth: Effects related to project-influenced development effects. These effects are similar to encroachment-alteration effects, but occur as a result of induced growth.

5.1.5.1 Encroachment-Alteration Effects

Ecological Effects

The proposed 2nd Access Project would provide access to undeveloped areas of the mainland and South Padre Island and would alter the existing function of the physical and social environment. Potential encroachment-alteration effects to biological resources include impacts related to land use changes, habitat fragmentation/edge-effects, loss of habitat effectiveness, water quality, and air quality. Other encroachment-alteration effects include those related to increased human-wildlife interaction, including the potential for collisions of vehicles with wildlife.

The dominant indirect effect that would occur relates to the change in land use from the encroachment of the proposed roadway. The proposed 2nd Access Project would convert between 175.60 acres and 240.59 acres of land to transportation use from its existing use.

Fragmentation would occur since the new roadway would encroach upon and alter the existing landscape. Specifically, the new roadway would bisect existing habitat patches. Fragmentation would reduce the total acreage of available habitat, which could cause overcrowding of the remnant patches and increased competition within the remnant patch.

Indirect effects related to encroachment-alteration could also occur as habitat adjacent to roads

and other development could experience a loss of habitat effectiveness. Operation and maintenance of the proposed 2nd Access Project would result in a low level of disturbance from traffic noise and vehicle activity, with occasional higher levels of noise during periodic maintenance activities. However, wildlife would be expected to either move to areas away from the roads and other development or to habituate.

The majority of the potentially substantial impacts are related to water quality impacts and the associated impacts on aquatic biological resources. Examples of water quality deterioration would be increased pollutant loading of stormwater runoff or accidental chemical/fuel spills occurring after the roadway is opened to traffic. Because these impacts are separated from the construction of the proposed project and would occur later in time, they are considered indirect effects. Impacts from accidental spills or runoff would vary depending on the contaminants involved, the volume of chemical runoff, and the distance from the roadway. For example, the farther away from the spill, the more diluted the runoff becomes, and the less impact the roadway has on the water and biological resources.

The Laguna Madre crossing bridge would cause encroachment-alteration effects in the form of shading of the waterbody below. Moreover, bridge piers would alter the structure of the floor of the Laguna Madre and alter water current velocities and flow patterns with associated scour and water column suspended sediment effects. The extent of the potential scouring has not been fully assessed; however, a detailed scour analysis of the structure would be conducted during the design phase of the project. Current changes have been shown to influence seagrass community productivity and species distribution (Fonseca and Kenworthy 1987). Bridge pilings can provide an environment for epibenthic species such as barnacles, thereby enhancing habitat for juvenile essential fish habitat species prey such as shrimp species (State of New Jersey n.d.).

Encroachment-alteration effects were considered in relation to air quality. The area of influence is in Cameron County, which is in attainment for all National Ambient Air Quality Standards (NAAQS). Based on the results of Steps 1 through 4 that evaluated the possible project-related actions that can indirectly impact air quality, it was determined that the proposed project would not be anticipated to cause indirect air quality impacts in the area of influence. No change in attainment status is anticipated within the area of influence as the result of emissions associated with the proposed project. Indirect air quality impacts from Mobile Source Air Toxics (MSAT) are unquantifiable due to existing limitations to determine pollutant emissions, dispersion, and impacts to human health. Emissions would likely be lower than present levels in future years as a result of the Environmental Protection Agency's (EPA) national control regulations (e.g., new light-duty and heavy duty on road fuel and vehicle rules, the use of low sulfur diesel fuel). Even with an increase in vehicle miles traveled (VMT) and possible temporary emission increases related to construction activities, the EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions of on road emissions, MSATs, and the ozone precursors VOC and NOx. As the proposed project is not anticipated to result in indirect air quality impacts, further discussion in Steps 6 and 7, below, is not necessary.

Indirect effects from encroachment-alteration of the existing landscape could occur because of an increase in the rate of wildlife-vehicle collisions. Wildlife-vehicle collisions would be expected to increase in areas where new roadway would be added or existing roads expanded due to encroachment-alteration of areas that are currently wildlife habitat.

Socioeconomic Effects

There are potential areas of concern for socioeconomic issues because there are minority and

low-income populations near all reasonable alternatives. However, given the demographics of the area, as discussed in **Chapter 3**, it is unlikely that there would be adverse impacts to minority and low-income populations. Generally, adverse indirect effects are those typically associated with development activities, and include noise levels, visual changes to the community, and commercial facilities that may not be used by minority and low-income populations. Noise impacts would include traffic noise in areas previously undisturbed by traffic noise. Visual impacts would largely amount to the introduction of a new structure over the Laguna Madre. Whether the visual impacts of such development should be characterized as negative or positive would depend on individual observers. The potential adverse impacts would be expected to be somewhat offset by the benefits associated with development induced by the proposed 2nd Access Project.

Potential beneficial impacts would include stimulation of the local economy from the circulation of construction spending; improved access to employment opportunities; improved access to markets, goods and services, such as health and education; increased property values leading to increased city and county tax revenues; improvements and additions to pedestrian and public transportation; and increased work opportunities. Additionally, the proposed 2nd Access Project is anticipated to have a beneficial effect on local and regional economies, as discussed in *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009).

Indirect effects pertaining to air quality, access to public facilities and services, traffic operations and traffic noise would be experienced by the environmental justice population to the same extent and in the same manner (whether positive or negative) as experienced by the general population. Because indirect effects to environmental justice communities of concern can be both adverse and beneficial, and because proactive public involvement and coordination with local planning officials can help avoid disproportionate impacts, potential indirect effects of the proposed 2nd Access Project on environmental justice communities of concern are not considered to be substantial.

5.1.5.2 Induced Growth Effects

The proposed 2nd Access Project would provide access to undeveloped areas of the mainland and South Padre Island. Increased access to undeveloped areas would make such areas more attractive for development and would be expected to increase the rate and density of development in these areas.

The indirect effects area of influence consists of approximately 233,205.6 acres of land. Of these 233,205.6 acres, there are approximately 17,407.7 acres of land that could be developed on South Padre Island and 21,688.5 acres of land that could be developed on the mainland. The remaining land is either developed or protected under the national wildlife refuge system.

As per the *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009), projected residential and commercial development can be assumed based on three scenarios: Low, Medium, and High. As defined in the aforementioned report, the Low scenario is based on a no-build scenario; the Medium scenario is based on the 2nd Access Project, but longer build out of other CCRMA projects; and the High scenario is based on implementation of the full CCRMA System Map on the current timeline. For purposes of discussing induced development from the proposed 2nd Access Project, data from the low and medium scenarios were analyzed in the following sections.

Induced Development on South Padre Island

There are currently 17,407.7 acres of undeveloped land on South Padre Island within the indirect effects area of influence, as shown in **Exhibit 5-3**. On South Padre Island, induced development is expected to occur north of the city limits of the City of South Padre island. Development on South Padre Island is ongoing and would likely continue with or without the proposed 2nd Access Project, as shown in **Table 5-6**.

Table 5-6: Projected Residential and Commercial Development on South Padre Island

Scenario	Residential (acres)				Commercial (acres)			
	2008	2015	2030	2045	2008	2015	2030	2045
No-Build Alternative (Low)	270.9	321.1	436.3	588.5	135.0	147.9	166.7	186.1
Build Alternative (Medium)	270.9	325.9	492.7	776.4	135.0	150.1	185.1	238.0
Induced Development	**0.0**	**4.8**	**56.4**	**187.9**	**0.0**	**2.2**	**18.4**	**51.9**

Source: TXP, Inc. (2009)

Under the No-Build Alternative scenario, residential and commercial development is expected to occur on South Padre Island. As of 2008, there were 270.9 acres of residential development and 135.0 acres of commercial development on South Padre Island. It is projected that there would be approximately 321.1 acres of residential development and 147.9 acres of commercial development on South Padre Island by 2015, which is an increase of 50.2 and 12.9 acres of residential and commercial development, respectively. Additionally, it is projected that there would be approximately 115.2 acres of new residential development and 18.8 acres of new commercial development on South Padre Island between 2015 and 2030, and approximately 152.2 acres of new residential development and 19.4 acres of new commercial development on South Padre Island between 2030 and 2045 (TXP, Inc. 2009).

Under the build alternative scenario, projections indicate that there would be approximately 325.9 acres of residential development on South Padre Island by 2015, which is an increase of 55.0 acres. Projections also indicate that there would be approximately 150.1 acres of commercial development on South Padre Island by 2015, which is an increase of 15.1 acres. Between 2015 and 2030, projections indicate that there would be an additional 166.8 acres of new residential development and 35.0 acres of new commercial development on South Padre Island. Lastly, projections indicate that there would be approximately 283.7 acres of new residential development and 52.9 acres of new commercial development on South Padre Island between 2030 and 2045 (TXP, Inc, 2009).

These projections indicate that under the No-Build Alternative scenario, there would be approximately 588.5 acres of residential development and 186.1 acres of commercial development on South Padre Island in 2045, which is an increase of 317.6 acres of residential development and approximately 51.1 acres of commercial development between 2008 and 2045, for a total of 368.7 acres of new development on South Padre Island. Projections indicate that under the build alternative scenario, there would be approximately 776.4 acres of residential development and 238.0 acres of commercial development on South Padre Island in 2045, which is an increase of 505.5 acres of residential development and 103.0 acres of commercial development between 2008 and 2045, for a total of 608.5 acres of new development on South Padre Island. Therefore, the proposed 2nd Access Project would induce approximately 187.9 acres of residential development and 51.9 acres of commercial development for a total of approximately 239.8 acres of induced development on South Padre Island between 2008 and 2045. Because South Padre Island is located entirely within the 100-

year floodplain boundary, all project-induced development on the island would occur within the 100-year floodplain boundary, representing 239.8 acres of floodplain encroachment impacts. Based on these projections, the increase in the amount of development on South Padre Island would be approximately 31.0 percent.

Induced Development on the Mainland

There are approximately 77,373.0 acres of undeveloped land on the mainland within the indirect effects area of influence, as shown in **Exhibit 5-4**. Based on past and current development patterns, it is assumed that induced development on the mainland from the proposed 2nd Access Project would occur primarily at the landing location, which is largely undeveloped, and would be similar in nature to the existing development pattern for the City of Port Isabel (TXP, Inc. 2009). **Table 5-7** provides the projected acreage of residential and commercial development on the mainland in 2008, 2015, 2030 and 2045 under the No-Build Alternative and build alternative scenarios.

Table 5-7: Projected Residential and Commercial Development on the Mainland

Alternative	Residential (acres)				Commercial (acres)			
	2008	2015	2030	2045	2008	2015	2030	2045
No-Build Alternative (Low)	275.0	359.7	497.7	908.3	15.6	66.5	148.1	540.5
Build Alternative (Medium)	275.0	381.9	542.6	995.2	15.6	74.1	172.8	615.9
Induced Development	**0.0**	**22.2**	**44.9**	**86.9**	**0.0**	**7.6**	**24.7**	**75.4**

Source: TXP (2009)

Under the No-Build Alternative scenario, residential and commercial development is expected to occur on the mainland. As of 2008, there were 275.0 acres of residential development and 15.6 acres of commercial development on the mainland within the indirect effects area of influence. It is projected that there would be approximately 359.7 acres of residential development and 66.5 acres of commercial development on the mainland within the indirect effects area of influence by 2015, which is an increase of 84.7 and 50.9 acres of residential and commercial development, respectively. Additionally, it is projected that there would be approximately 138.0 acres of new residential development and 81.6 acres of new commercial development on the mainland within the indirect effects area of influence between 2015 and 2030, and approximately 410.6 acres of new residential development and 392.4 acres of new commercial development on the mainland within the indirect effects area of influence between 2030 and 2045 (TXP, Inc. 2009).

Under the build alternative scenario, projections indicate that there would be approximately 381.9 acres of residential development on the mainland within the indirect effects area of influence by 2015, which is an increase of 22.2 acres. Projections also indicate that there would be approximately 74.1 acres of commercial development on the mainland within the indirect effects area of influence by 2015, which is an increase of 7.6 acres. Between 2015 and 2030, projections indicate that there would be an additional 160.7 acres of new residential development and 98.7 acres of new commercial development on the mainland within the indirect effects area of influence. Lastly, projections indicate that there would be approximately 452.6 acres of new residential development and 443.1 acres of new commercial development on the mainland within the indirect effects area of influence between 2030 and 2045 (TXP, Inc. 2009).

These projections indicate that under the No-Build Alternative scenario, there would be

approximately 908.3 acres of residential development and 540.5 acres of commercial development on the mainland within the indirect effects area of influence in 2045, which is an increase of 633.3 acres of residential development and 524.9 acres of commercial development on the mainland within the indirect effects area of influence between 2008 and 2045, for a total of 1,158.2 acres of new development. Under the build alternative scenario, the projections indicate that there would be approximately 995.2 acres of residential development and 615.9 acres of commercial development on the mainland within the indirect effects area of influence in 2045, which is an increase of 720.2 acres of residential development and 600.3 acres of commercial development on the mainland between 2008 and 2045, for a total of 1,320.5 acres of new development. Therefore, the proposed 2nd Access Project would potentially induce approximately 86.9 acres of residential development and 75.4 acres of commercial development, for a total of approximately 162.3 acres of induced development on the mainland within the indirect effects area of influence, between 2008 and 2045. Based on these projections, the increase in the amount of development on the mainland within the indirect effects area of influence would be approximately 11.2 percent.

Summary of Induced Growth Effects

Regional economic development, which is based on tourism, is the driving force behind land development within the indirect effects area of influence. Because of the variability of the economic markets over time, there is a high level of uncertainty in the timing of development. Considering the indirect effects area of influence's potential for growth, the proposed project has the potential to influence the location, timing and intensity of development within the indirect impacts area of influence.

Development intensity, or density, in the indirect effects area of influence is dependent on the availability of water and wastewater services and other utilities. Much of the indirect effects area of influence available for development lacks this essential infrastructure and would have to account for this need. However, eventual build-out of remaining developable land within the indirect effects area of influence is anticipated to occur with or without the proposed 2nd Access Project. Therefore, indirect effects associated with induced-growth effects from the proposed 2nd Access Project are not considered substantial since growth and effects from growth would occur with or without the proposed project.

5.1.5.3 Effects Related to Induced Growth

As shown in **Exhibits 5-3 and 5-4**, the majority of the indirect effects area of influence is undeveloped. However, much of the indirect effects area of influence is protected by various regulations, including the Coastal Barrier Resources Act, USFWS restrictions for development of threatened and endangered species and designated critical habitat, NOAA Fisheries restrictions for development that could impact essential fish habitat, and Federal Emergency Management Agency (FEMA) regulations. Although these areas could potentially be developed, there would be additional permitting and financial obligations to do so. Ecological effects related to induced growth would be similar to encroachment-alteration effects, as discussed in **Section 5.1.5.1**. In summary, ecological effects related to induced growth would include impacts related to land use changes, habitat fragmentation/edge-effects, loss of habitat effectiveness, water quality, and air quality.

The location of proposed 2nd Access bridge and landings would be anticipated to influence the location of induced development. Induced growth would logically be expected closest to the point of new access. In view of the scale of projected induced development (239.8 acres on the island and 162.3 acres on the mainland) and the minimum distance between potential landings

(1 mile on the island and 0.3 mile on the mainland), development would be expected to cluster in the vicinity of the selected landings while not extending to non-selected landing locations.

Socioeconomic effects from induced growth are expected to be mostly beneficial (i.e., promote economic development). Although development within the indirect effects area of influence is expected to occur with or without the proposed 2nd Access Project, it is expected that the proposed 2nd Access Project would increase the amount and rate of development on the mainland and on South Padre Island. This increase in the rate of development would be beneficial to the area due to the area's dependence on tourism. THK Associates, Inc. (2005) indicates that by 2015, tourism could increase by 2.5 percent annually. However, they state that to achieve this potential, adequate supporting infrastructure would be required and appropriate access would be fundamental to any success. They also state that South Padre Island needs an alternative access to the mainland at the north to allow for increased tourism, and thereby, economic development of the area. Therefore, it is expected that the proposed 2nd Access Project would allow economic development of the area to proceed as desired; thus, the indirect socioeconomic effects would be beneficial.

Perhaps the most beneficial socioeconomic effect would be the increase in the number of jobs in the region. TXP, Inc. (2009) forecasted employment on South Padre Island and on the mainland based on the Low, Medium and High scenarios previously discussed in **Section 5.1.5.2**. For purposes of analyzing induced employment from the proposed 2nd Access Project, data from the low and medium scenarios were utilized. **Table 5-8** provides the projected increase in employment and percent change on South Padre Island and on the mainland in 2008, 2015, 2030 and 2045 under the No-Build Alternative and Build Alternative scenarios.

The tourism sector of South Padre Island is heavily dependent on the Texas economy since a large number of visitors to South Padre Island live within the state (approximately 70 percent, according to a 2006 South Padre Island Visitor Tracking Survey). Employment on South Padre Island fluctuates based on tourism. During the past 10 to 15 years, South Padre Island employment has expanded 1.0 to 1.5 percent per year. With the construction of the proposed 2nd Access Project, it is estimated that an additional 1,655 jobs would be created on South Padre Island by 2045, which is an increase of 27.8 percent over the No-Build Alternative.

Table 5-8: Employment Forecast on South Padre Island and the Mainland

Alternative	South Padre Island					Mainland (Port Isabel and Laguna Vista)				
	2008	2015	2030	2045	Increased Employment/ Percent Change, 2008-2045	2008	2015	2030	2045	Increased Employment/ Percent Change, 2008-2045
No-Build Alternative (Low)	4,310	4,722	5,323	5,943	**1,633/ 37.9%**	1,827	2,477	3,733	8,603	**6,776/ 370.9%**
Build Alternative (Medium)	4,310	4,793	5,909	7,598	**3,288/ 76.3%**	1,827	2,560	4,083	9,530	**7,703/ 421.6%**
Induced Employment	**0**	**71**	**586**	**1,655**	**--**	**0**	**83**	**350**	**927**	**--**
Percent Change	**--**	**1.5**	**11.0**	**27.8**	**--**	**--**	**3.4**	**9.4**	**10.8**	**--**

Source: TXP, Inc. 2009

Induced employment opportunities on the mainland from construction of the proposed 2nd Access Project would be expected primarily along the constructed facility. Based on the amount of developable land within the City of Port Isabel and the Village of Laguna Vista, as well as along the build alternatives, it is expected that Port Isabel would experience modest employment growth and Laguna Vista would experience strong employment growth with or without the proposed 2nd Access Project. Since there is generally a shortage of developable land within Port Isabel, there are limits to how much the city can physically grow, which limits the ability of the city to create employment opportunities. Conversely, real estate activity surrounding the South Padre Island Golf Club/Community near Laguna Vista is expected to result in 1,000 acres of mixed-use development. This area is currently underserved by basic retail and service employment opportunities, and it is expected that the existing and planned development would attract numerous new employers to provide basic services. Under the no-build scenario, it is estimated that there would be approximately 6,776 additional employment opportunities on the mainland between 2008 and 2045, which is an increase of 370.9 percent. With the construction of the proposed 2nd Access Project, there would be approximately 7,703 additional employment opportunities on the mainland, or 927 additional employment opportunities than without the proposed project. Therefore, induced employment opportunities on the mainland in 2045 would increase by approximately 10.8 percent.

5.1.6 Step 6: Analyze Indirect Effects and Evaluate Results

The potential for indirect effects on the notable features identified in Step 3 is analyzed and evaluated in this section. For induced growth effects, two scenarios were assessed: (1) single resource scenario, and (2) resource distribution scenario. The single resource scenario assumes that the entirety of induced development effects would occur to single resource (e.g., ocelot/jaguarundi habitat). However, given the amount of induced development anticipated (402.1 acres, which includes 239.8 acres on South Padre Island and 162.3 acres on the mainland) and the distribution of multiple resources within the area of influence, it is unlikely that induced development would impact only a single resource; therefore, a more probable scenario (the resource distribution scenario) was also assessed. Under the resource distribution scenario, the aerial extent of each resource in the indirect effects area of influence was calculated as a percentage of the overall area. The percentage was then applied to the amount of induced development anticipated to determine a realistic impact scenario based on probability of occurrence. For example, if Resource A covers ten percent of the area of influence on both South Padre Island and the mainland, then under the resource distribution scenario, 40.2 acres of impact to Resource A would be assumed (10 percent of 402.1 acres). However, if Resource A only occurs on South Padre Island, then 24.0 acres of impact to Resource A would be assumed (10 percent of 239.8 acres). Similarly, if Resource A only occurs on the mainland, then 16.2 acres of impact to Resource A would be assumed (10 percent of 162.3 acres).

5.1.6.1 NF-1: Threatened and Endangered Species Habitat

Encroachment-Alteration Effects

Indirect effects related to encroachment and alteration of the existing habitat from the proposed 2nd Access Project to threatened and endangered species (NF-1) could include the fragmentation of habitat patches, traffic noise interfering with animal behaviors in habitat patches outside of the proposed ROW, wildlife-vehicle collisions, changes to habitat due to the alteration of drainage patterns and introduction of edge effects (vegetation, structure, habitat use) to areas adjacent to the new roadway. Road-based mortality is the documented leading cause of direct mortality to ocelots in South Texas (Haines et. al. 2005).

Fragmentation would occur since the new roadway would bisect existing habitat patches, blocking movement of ocelot and jaguarundi and disrupting connectivity between habitat patches. Fragmentation would reduce the total acreage of available habitat, which could cause overcrowding of the remnant patches and increased competition within the remnant patch. There is no protection for 86.1 percent of the area of influence from encroachment-alteration effects; however, approximately 13.9 percent of the indirect effects area of influence is comprised of National Wildlife Refuge lands. While these properties provide managed habitat for threatened and endangered species, some of these lands would nevertheless be subject to encroachment-alteration effects from adjacent development. The 2nd Access Project was designed in consultation with the USFWS to minimize impacts to threatened and endangered species, including the potential fragmentation of habitat patches.

Indirect effects to threatened and endangered species habitat (NF-1), including designated critical habitat, could also occur as habitat adjacent to roads and other development could experience a loss of habitat effectiveness. Operation and maintenance of the proposed 2nd Access would result in a low level of disturbance from long-term traffic noise and vehicle activity, with higher levels expected during the day and lower levels expected at night. In addition, there would be occasional higher levels of noise during periodic maintenance activities. Wildlife would be expected to move to areas away from the roads and other development, or species would habituate. As noted by the USFWS, the intersection of a new bridge with Park Road 100 could result in secondary impacts to piping plovers and critical habitat as a result of increased traffic on the Laguna Madre shoreline around the bridge, artificial lighting associated with the bridge structure, and new perching structures for shorebird predators, such as raptors.

Sea turtle foraging could also be affected by shading impacts to seagrass beds, which would alter sea turtle habitat in the bridge vicinity. According to the USFWS, the green sea turtle, the most common Laguna Madre sea turtle species, could be most affected by shading impacts to seagrass.

Artificial lighting would be limited to the bridge structure, intersections and other locations when required for safety. Low-impact artificial lighting would be used to minimize potential lighting encroachment effects to wildlife. Directional, shielded light fixtures that focus illumination downward to the roadway surface while minimizing lighting of the surrounding area would be incorporated into the final design.

Indirect effects to threatened and endangered species habitat (NF-1), including designated critical habitat, could occur because of an increase in the rate of wildlife-vehicle collisions. Specifically, wildlife-vehicle collisions would be expected to increase in areas where new roadway would be added or existing roads expanded due to encroachment-alteration of areas that are currently wildlife habitat.

Other indirect effects from encroachment-alteration could include bird collisions with the bridge structure. While bird collisions with the bridge structure could occur, bridges are not identified as substantial sources of bird collision mortality; most bird collision mortality is associated with power and communication lines and glass windows, as well as motor vehicles (USFWS 1979). In summary, bird mortality associated with the roadway would primarily be related to vehicles using the roadway. Moreover, bridge design and lighting could reduce any potential for bird-bridge collisions. Some species, such as gulls, could use the bridge structure as a convenient roost or perch when foraging.

Induced Growth Effects

As discussed in **Section 5.1.5.2**, the proposed 2nd Access Project could induce approximately 402.1 acres of development within the indirect effects area of influence, which includes 239.8 acres of development on South Padre Island and 162.3 acres of development on the mainland. A geographic information system was used to overlay threatened and endangered species habitat, including ocelot and jaguarundi habitat, Northern Aplomado Falcon habitat, Piping Plover habitat, USFWS-designated Piping Plover critical habitat, and sea turtle nesting habitat, over the lands that are available for development on South Padre Island and on the mainland, as discussed in **Section 5.1.5.2**. Based on single resource scenario, it was determined that the proposed 2nd Access Project could affect 162.3 acres (0.3 percent) of ocelot and jaguarundi habitat, 162.3 acres of Northern Aplomado Falcon habitat (0.2 percent), up to 402.1 acres (3.3 percent) of Piping Plover habitat, up to 239.8 acres (2.0 percent) of USFWS-designated Piping Plover critical habitat, and/or up to 239.8 acres of sea turtle nesting habitat (45.5 percent) within the indirect effects area of influence. However, it is unlikely that all induced growth would occur within a single resource.

Under the resource distribution scenario, induced development from the 2nd Access Project could affect approximately 82.9 acres (0.07 percent) of ocelot and jaguarundi habitat, 154 acres of Northern Aplomado Falcon habitat (0.07 percent), up to 20.2 acres (0.17 percent) of Piping Plover habitat, up to 12.4 acres (0.10 percent) of USFWS-designated Piping Plover critical habitat, and/or up to 0.5 acre of sea turtle nesting habitat (0.10 percent) within the indirect effects area of influence. Based on this scenario, indirect effects to threatened and endangered species from induced growth are not expected to be substantial.

Effects Related to Induced Growth

Development of residential and commercial areas, support facilities, and new transportation routes would place additional pressures on wildlife resources and their habitats. As habitat is converted by human development, the remaining tracts of available habitat become smaller in size and have reduced value to terrestrial animals because of edge effects and increased exposure to human disturbance. For large, wide-ranging species, habitat patches can become of insufficient size to provide adequate home range, resulting in local extirpation of the species. Populations could be fragmented into smaller subpopulations, causing increased demographic fluctuation, inbreeding and loss of genetic variability. Habitat fragmentation could also lead to an increase in predation at the perimeter of fragmented habitat. Additionally, as development of the area increases, so would the frequency of human-wildlife conflicts. These conflicts may take many forms, including human encounters, wildlife-vehicle accidents and wildlife-caused property damage. Such conflicts could result in increased mortality to wildlife and also result in safety concerns for humans (e.g., injury, death, economic loss). An increased number of boaters could result in an increase in deliberate or accidental landings on the island during nesting season, potentially resulting in nesting disturbance.

5.1.6.2 NF-2: Colonial Waterbird Rookeries

Encroachment-Alteration Effects

Indirect effects to colonial waterbird rookeries (NF-3) could occur from encroachment-alteration of the existing habitat by the proposed project. Indirect effects could include a loss of habitat effectiveness. Operation and maintenance of the Laguna Madre crossing would result in a low level of disturbance from traffic noise and vehicle activity, with occasional higher levels of noise during periodic maintenance activities. Other indirect effects from encroachment-alteration could include bird collisions with the bridge structure, as discussed in **Section 5.1.6.1**.

Induced Growth Effects

The colonial waterbird rookeries are located on spoil islands within the Laguna Madre. The spoil islands are not appropriate for development; therefore, there would be no induced growth effects on colonial waterbird rookeries.

Effects Related to Induced Growth

The induced growth from the proposed 2nd Access Project would impact colonial waterbird rookeries within the Laguna Madre as habitat is utilized for commercial and recreational development. Specifically, the increase in development into areas near the proposed landing for the bridge on South Padre Island and to the north of the landing would likely lead to additional marinas and increased recreational boating in the Laguna Madre in areas that have previously been fairly isolated from such impacts. Therefore, there would be additional noise near the rookeries, which could lead to a loss of rookery effectiveness.

5.1.6.3 NF-3: Seagrasses

Encroachment-Alteration Effects

Indirect effects to seagrasses (NF-3) from encroachment-alteration of seagrass habitat could result from the modification of currents in the Laguna Madre, which would alter the existing suspended sediment regime. Current changes have been shown to influence seagrass community productivity and species distribution (Fonseca and Kenworthy 1987) and bridge pilings can provide an environment for epibenthic species such as barnacles, thereby enhancing habitat for juvenile essential fish habitat species prey such as shrimp (State of New Jersey 2009). Additional impacts are related to changes in current velocity, scouring of the water body floor, and associated suspended sediments as they relate to bridge piers. It should be noted that the extent of the potential scouring has not been fully assessed; a detailed scour analysis of the structure would be conducted during the design phase of the project. These impacts would change the floor of the Laguna Madre, and thereby create habitat changes for benthic organisms, including seagrasses (NF-3).

Shading from the bridge structure could negatively impact survival and productivity of seagrasses affecting essential fish habitat and habitat for Laguna Madre species such as green turtle, loggerhead turtle, and hawksbill turtle. These shading impacts vary by the time of day and season. The effects of bridge shading become relatively negligible when the structure is oriented north/south. However, the effects of bridge shading increase as the structure is oriented closer to an east/west structure such as the 2nd Access Project.

The irradiance requirements of turtlegrass (*Thalassia testudinum*) were estimated by Dixon and Leverone (1995) by measuring photosynthetically active radiation attenuated by the water column and the epiphytes on seagrass blades. This estimate of photosynthetically available radiation was used to identify the light irradiance available to the turtlegrass blades. The results of the study estimated that a minimum light requirement for turtlegrass is approximately 27.6 percent of the ambient light irradiance at the surface.

Bridge shading of the 2nd Access Project was modeled using Sketch Up Pro 7. The model requires the dimensions of a theoretical bridge structure to model the extent of bridge shading throughout the year. **Table 5-9** identifies the bridge dimensions incorporated into the shading model.

Table 5-9: Modeled Bridge Dimensions

Dimension	Length (Feet)
Bridge Height (Deck)	34
Bridge height (Bottom of Beam)	26
Bridge Width	80
Bridge Thickness	8

The shading model identified the length of shadow each hour from dawn until dusk for the 15th of each month. The degree of shading was categorized into 10-percent increments. Each 10-percent increment added one hour of shade to the waters below. The total width of shading varies over the season (**Table 5-10**). **Table 5-10** identifies the width of the area that would be shaded for a stated percentage of time. For examples, in January, a 300-foot swath would be shaded 10 to 20 percent of the time, a 100-foot swath would be shaded 30 percent of the time, etc.

Table 5-10: Width of Shaded Area for each Shading Category

Month	Width of Shaded Area (Feet)						
	10-20 percent	30 percent	40 percent	50 percent	60 percent	70 percent	80 percent
January	300	100	85	70	55	45	15
February	310	120	85	75	55	50	25
March	245	115	80	70	60	50	35
April	245	115	90	80	70	60	50
May	200	110	90	80	70	60	50
June	180	110	85	80	70	65	55
July	180	110	90	80	70	60	55
August	220	115	90	80	70	55	55
September	320	110	85	75	65	55	45
October	325	105	85	75	65	50	30
November	295	110	85	70	60	50	35
December	255	105	80	75	60	50	20

The model identified the length of shadow each hour from dawn until dusk for the 15th of each month. There was an area identified that was permanently shaded, for each 10-percent increment, throughout the year (**Table 5-11**). The permanent shaded areas are skewed to the north due to the predominately southern aspect of the sun at the latitude of the 2nd Access Project.

Table 5-11: Width of Relative Permanent Shading by Percent Shading Category

Percentage Category	Distance from the Centerline of Bridge (Feet)		
	South Edge	North Edge	Total Width Permanently Shaded
10-20	5	35	40
30	15	40	55
40	20	45	65
50	25	50	75
60	30	50	80
70	40	60	100
80	75	65	140

Based on Dixon and Leverone's (1995) estimate of epiphytic attenuated light irradiance requirements for turtlegrass (approximately 30 percent of ambient surface irradiance), the shading model predicts the relative permanent shading of a 55-foot wide swath of seagrass under the modeled structure. Therefore, the loss of seagrass production within the permanently

shaded areas (P_s) would be 100-percent compared to unshaded areas.

Averaged over the year, an additional 215-foot swath of seagrass would be affected due to the partial shading of the seagrass beds caused by the bridge structure. The loss of seagrass productivity was calculated utilizing a linear function where the productivity of the area that is permanently shaded is equivalent to a 100-percent loss of production and the area at the edge of the shadow is equivalent to a 0-percent loss. Due to the different shadow effects attributed to the southerly aspect of the sun, linear functions were developed separately for shaded areas on the north and south sides of the bridge (**Equations 5-1 and 5-2** respectively). The results of the analysis provide an estimate of the equivalent acreage of seagrass required to offset the loss of seagrass production due to shading.

Equation 5-1:

$$P_{north} = L \times \int_{0}^{90} (1.1266x - 1.1205)dx$$

Equation 5-2:

$$P_{south} = L \times \int_{0}^{125} (0.7972x - 0.79)dx$$

Where $P_y =$ equivalent acres of seagrass required to replace loss of productivity, $L =$ the linear length of the structure over the seagrass beds, and $x =$ the distance between the permanently shaded area and the edge of the shadow.

The estimate of loss of productivity is calculated by adding the acreage of permanently shaded areas to the equivalent acreage of lost productivity in partially shaded areas ($P_s + P_{north} + P_{south}$). Estimates of the equivalent acres of seagrass impacts due to shading are presented in **Table 5-12**.

Table 5-12: Lost Productivity of Seagrasses

Alternative	Equivalent Acres of Lost Productivity		
	Partial Shade	Full Shade	Total
1	37	19	56
2	37	19	56
3	30	15	45
4	55	28	83
5	55	28	83
6	54	28	82
7	54	28	82
8	64	33	97
9	64	33	97
10	58	30	88
11	58	30	88

As presented in **Table 5-12**, Alternative 3 would have the least indirect shading impact on seagrasses equivalent to 45 acres of unshaded seagrass. Alternatives 8 and 9 would have the greatest impacts at 97 acres.

The shading analysis assumes that there is no ambient light available in fully shaded areas and the relationship between seagrass productivity and light availability is a linear function. Although these assumptions might not hold true, the model provides a conservative estimate of potential shading impacts to seagrasses in the project area.

Induced Growth Effects

Induced growth effects on water quality could result in conjunction with induced growth (i.e., development) on South Padre Island and the mainland. Development trends for the area and reasonably foreseeable future development indicate that development occurs near the shoreline and in the shallow waters (e.g., boat docks). The induced growth from the proposed 2nd Access Project would further impact seagrasses within the Laguna Madre as habitat is utilized for commercial and recreational development.

Effects Related to Induced Growth

The increase in development into areas near the proposed landing for the bridge on South Padre Island and to the north of the landing would likely lead to increased recreational boating in seagrass beds that have previously been fairly isolated from such impacts.

5.1.6.4 NF-4: Essential Fish Habitat

Encroachment-Alteration Effects

Development of the proposed 2nd Access Project could result in indirect effects to essential fish habitat (NF-4) from encroachment-alteration effects, which would be anticipated in areas where current velocities would be reduced, resulting in increased sedimentation. Additionally, bottom sediments may potentially be scoured because of increases in current velocities. As noted previously, the extent of the scouring has not been fully assessed and a detailed scour analysis would occur during the project design phase. Accidental spills on the causeway could result in contaminants introduced to the Laguna Madre. These factors could affect the integrity of essential fish habitat (NF-4).

Induced Growth Effects

Induced growth effects on water quality could result in conjunction with induced growth (i.e., development) on South Padre Island and the mainland. Development trends for the area and reasonably foreseeable future development indicate that development occurs near the shoreline and in the shallow waters (e.g., boat docks). Development in the area has been addressed in development plans and policies to ensure minimal impact to resources. However, since the induced growth from the proposed 2nd Access Project would increase the rate of development, it would further impact water quality, and thereby essential fish habitat, within the Laguna Madre as terrestrial habitat is utilized for commercial and recreational development.

Effects Related to Induced Growth

Indirect effects to water quality and essential fish habitat related to induced growth effects could occur through degradation of surface water quality via increased pollutants (e.g., oils, pesticides, household contaminants) in runoff from impervious cover from future development. Development effects that contribute to water quality degradation include increased impermeable surface and increased non-point source pollution. The indirect effects of development could include increased stormwater runoff velocities and pollutant loads leading to impacts to water quality and associated aquatic biological resources. Additionally, better access and increased use of the Laguna Madre due to induced development and associated population increases would increase hydrocarbons and other pollutants in the water from boats and personal watercraft.

5.1.6.5 NF-5: Prime Farmland

Encroachment-Alteration Effects
There would be no encroachment-alteration effects associated with prime farmland.

Induced Growth Effects
The proposed 2nd Access Project would have some indirect effects on land use, including the conversion of prime farmland to residential and commercial uses. Specifically, the improved access to rural areas could encourage private development in areas with prime farmland soils (NF-5).

A geographic information system was used to overlay areas of prime farmland over the lands that are available for development on South Padre Island and on the mainland, as discussed in **Section 5.1.5.2**. Based on the single resource scenario, it was projected that up to 162.3 acres (1.0 percent) of prime farmlands on the mainland could be impacted by induced growth. Based on the resource distribution scenario, it is assumed induced development would affect approximately 11.5 acres (0.07 percent) of prime farmlands on the mainland.

Prime farmlands within the 2nd Access Project study area scored between 26 and 52 points on the NRCS Form CPA-106. Any sites receiving scores less than 160 points are given a minimal level of consideration for protection. It is expected that the prime farmland soils (NF-5) and conditions within the indirect effects area of influence would also results in scores below the threshold requiring coordination with the NRCS and would be given a minimal level of consideration for protection. Additionally, since the potential impacts to prime farmland soils from induced development would comprise 1.0 percent or less of the total prime farmlands on the mainland, indirect effects to prime farmland (NF-5) from induced growth was determined insubstantial.

Effects Related to Induced Growth
Development on the mainland is expected to occur with or without the proposed 2nd Access Project. Induced growth would convert agricultural lands with prime farmland soils to other land uses. The conversion of farmlands to other uses is generally considered permanent because of permanent disruption to the soil and the expense to return developed land to productive agriculture. Therefore, the effects related to induced growth would be a loss of agricultural land within the region.

5.1.6.6 NF-6: National Wildlife Refuges

Encroachment-Alteration Effects
Indirect effects to National Wildlife Refuge (NF-6) properties would include purchase of properties proposed for acquisition by the USFWS in the *Laguna Atascosa National Wildlife Refuge Proposed Refuge Expansion Plan, Environmental Assessment and Conceptual Management Plan* (USFWS 1999a), which states that the USFWS proposes to acquire lands in the northern portion of South Padre Island, from the end of the SH 100 pavement to the Port Mansfield Cut, as well as lands adjacent to the existing Laguna Atascosa National Wildlife Refuge on the mainland. Additionally, construction and operation of the proposed 2nd Access Project would increase travel volumes within the area, which could diminish the recreational experience for those driving in the area to gain access to the National Wildlife Refuges (NF-6). However, construction of the proposed 2nd Access Project would provide better access to the National Wildlife Refuges (NF-6) in the area, thereby serving the increasing demand by visitors for ecotourism recreational opportunities in the area. Endangered species habitat fragmentation would occur since the new roadway would bisect existing habitat patches, blocking movement

of ocelot and jaguarundi and disrupting connectivity between habitat patches.

Induced Growth Effects
National wildlife refuges are protected from development; therefore, induced growth from the proposed 2nd Access Project would not impact these properties.

Effects Related to Induced Growth
Induced growth could provide additional local tourism opportunities in the area. However, induced growth could cause a competition for land between the USFWS and private developers. This competition would potentially drive up the price of land, making it increasingly unavailable for the USFWS to purchase, reducing the amount of refuge land that could be added in the future. In areas identified as desirable for purchase by USFWS as refuge properties, induced development and the resulting habitat fragmentation would also potentially reduce the wildlife use of and thus the ecological value of such areas as wildlife refuges.

5.1.6.7 NF-7: Public Parks

Encroachment-Alteration Effects
Construction of the proposed 2nd Access Project would include improvements to Park Road 100 on South Padre Island, which could increase the use of E.K. Atwood Park and public beaches to the north of the City of South Padre Island (NF-7). Improved public access resulting indirectly from construction and operation of the proposed 2nd Access Project could increase the use of this park and the northern public beaches. Increased congestion in public parks and beaches could reduce user satisfaction.

Induced Growth Effects
There are approximately 365.88 acres of public parks, not including beaches, on South Padre Island and the mainland within the indirect effects area of influence. As discussed in **Section 5.1.5.2**, the proposed 2nd Access Project could induce up to 402.1 acres of development within the indirect effects area of influence. Therefore, under the single resource scenario, induced growth could affect up to 100 percent of the existing public parks within the indirect effects area of influence. Under the resource distribution scenario, it is estimated that induced development would affect 0.6 acre (0.17 percent). Although induced development could impact public parks, it is unlikely that Cameron County or the individual municipalities would issue permits for development in County Parks; therefore, induced growth effects on public parks are not considered substantial.

Effects Related to Induced Growth
It is expected that much of the land to the north of the city limit of the City of South Padre Island would enter the marketplace for private residential and commercial uses, with or without the proposed 2nd Access Project. However, as discussed in **Section 5.1.5.2**, increased access (i.e., the construction of the proposed 2nd Access Project) to undeveloped areas would make such areas more attractive for development and would be expected to increase the rate and density of development in these areas. This induced development could have an indirect impact on recreation by limiting recreational opportunities in these areas. Although the Texas Open Beaches Act requires that public access to all beaches along the Texas Coast be maintained.

5.1.6.8 NF-8: Coastal Barrier Resources Act Lands

Encroachment-Alteration Effects
There would be no encroachment-alteration effects associated with Coastal Barrier Resources Act lands.

Induced Growth Effects

There are approximately 19,055.12 acres of Coastal Barrier Resources Act lands on South Padre Island. While areas of potential development on South Padre Island are within areas designated as Coastal Barrier Resources Act lands, access to these areas is currently limited. Park Road 100 ends near the southernmost extent of the Coastal Barrier Resources Act lands in the northern part of the area of influence. The proposed 2nd Access Project would not involve an extension of Park Road 100; thus, the Coastal Barrier Resources Act lands north of the project area would remain virtually inaccessible. Additionally, as previously stated, most induced growth would be anticipated to occur near the proposed bridge landing. The northern-most landing location is approximately 3 miles from the Coastal Barrier Resources Act lands. As discussed in the TXP report (2009) development in Coastal Barrier Resources Act lands is cost prohibitive due to General Land Office and U.S. Army Corps of Engineers requirements. For these reasons, it is not likely that the estimated induced growth for South Padre Island would impact Coastal Barrier Resources Act lands.

Effects Related to Induced Growth

It is expected that land to the north of the city limit of the City of South Padre Island would enter the marketplace for private residential and commercial uses, with or without the proposed 2nd Access Project. However, as discussed in **Section 5.1.5.2**, increased access (i.e., the construction of the proposed 2nd Access Project) to undeveloped areas could make such areas more attractive for development and would be expected to increase the rate and density of development in these areas. However, as stated above, it is not likely that the estimated induced growth for South Padre Island would impact Coastal Barrier Resources Act lands.

5.1.6.9 Summary of Indirect Effects

The majority of the eight notable features are not anticipated to be substantially impacted by the proposed 2nd Access Project, as shown in **Table 5-13**. However, it is anticipated that there would be potentially substantial indirect effects to seagrasses and essential fish habitat from the proposed 2nd Access Project, as described in **Sections 5.1.6.3** and **5.1.6.4**.

Table 5-13: Indirect Effects on Notable Features

Resource ID	Notable Feature	Anticipated Indirect Impact
NF-1	Threatened and endangered species habitat, including ocelot habitat on the mainland, Piping Plover habitat (mudflats), and Piping Plover USFWS - designated critical habitat on South Padre Island	Not substantial – The proposed 2nd Access Project could induce development on up to 0.07 percent (82.9 acres) of ocelot habitat, 0.07 percent (154 acres) of Northern Aplomado Falcon habitat, 0.17 percent (20.2 acres) of Piping Plover habitat, 0.10 percent (12.4 acres) of USFWS-designated Piping Plover critical habitat, and/or 0.10 percent (0.5 acre) of sea turtle nesting habitat. Effects from induced development are not considered substantial. The impact from induced development to the region's remaining wildlife and habitat would be minimized by enforcement of USFWS and TPWD regulations for projects subject to state and Federal jurisdiction. At the local level, governments have the authority through zoning and land use regulations to guide the intensity, type, and location of new development.
NF-2	Colonial waterbird rookeries on spoil islands within the Laguna Madre	Not substantial – Colonial waterbirds would be expected to habituate to the indirect effects from the proposed 2nd Access Project.

Resource ID	Notable Feature	Anticipated Indirect Impact
NF-3	Seagrasses within the Laguna Madre	Substantial – Seagrasses are a sensitive species that require precise living conditions. Changes in current velocities and patterns, sedimentation, light filtration and recreational boating could potentially impact the rate of growth of seagrasses. Shading could decrease productivity of approximately 45 to 97 equivalent acres of unshaded seagrass.
NF-4	Essential fish habitat	Substantial – Although indirect effects to essential fish habitat would be minimized due to existing regulations regarding development (e.g., required permits), many managed species are estuary dependent and dependent on seagrasses. Therefore, the loss of coastal wetlands, seagrasses, and tidal flats would have the potential to adversely affect essential fish habitat and the associated managed species. Additionally, decreased water quality would cause a functional impairment of essential fish habitat primarily due to the increase in suspended sediments.
NF-5	Prime farmland on the mainland	Not Substantial – Induced development could affect up to 0.07 percent of prime farmlands within the indirect effects area of influence. Additionally, prime farmland within the indirect effects area of influence would likely be below the threshold requiring coordination with the NRCS; therefore, indirect effects are not considered substantial.
NF-6	National Wildlife Refuges on the mainland	Not Substantial – National Wildlife Refuges are protected from development; however, induced development from the proposed 2nd Access Project could cause a competition for land between the USFWS and private developers. This competition could potentially drive up the price of land, making it increasingly unavailable for the USFWS to purchase, reducing the amount of refuge land that could be added in the future. However, the Laguna Atascosa National Wildlife Refuge has prepared and environmental assessment and received a "Finding of No Significant Impact" in which it identified preferred lands for expansion. The Refuge has purchased some of the land and is in discussions with other willing sellers/donators. Therefore, since the current landowners are willing participants in the expansion of the National Wildlife Refuge, the potential competition for land is not expected to be a substantial impact.
NF-7	Public parks on South Padre Island	Not Substantial – Induced development is not expected to affect public parks.
NF-8	Coastal Barrier Resources Act lands	Not Substantial – Induced growth is not likely to impact lands designated under the Coastal Barrier Resources Act.

5.1.7 Step 7: Assess Consequences and Consider/Develop Mitigation

Potential indirect effects to notable features are not anticipated to be substantial, with the exception of encroachment-alteration impacts to seagrasses and essential fish habitat. There are two indirect effects that may be considered substantial with respect to impacts to seagrasses:

1. Modification of currents in the Laguna Madre, potentially resulting in scouring of the bay floor and an alteration of the existing suspended sediment regime. A detailed scour analysis

of the structure would be conducted during the design phase of the project to determine if there would be an increase in scouring resulting in indirect impacts to seagrasses.
2. Shading from the bridge structure would decrease the light availability and penetration through the water to the appropriate depth for seagrasses.

There are two indirect effects that may be considered substantial with respect to impacts to essential fish habitat:

1. The loss of coastal wetlands, seagrasses, and tidal flats would have the potential to adversely affect essential fish habitat and the associated managed species.
2. Decreased water quality would cause a functional impairment of essential fish habitat primarily due to the increase in suspended sediments.

Initial mitigation measures in the planning or alignment of highway projects minimize the probable occurrence of impacts through route location (avoidance/minimization) and construction practices. Activities to minimize the impacts to habitats from highway construction would include the following: minimizing devegetation of the construction area wherever safety allows, decreasing the amount of fill placement and implementation of best management practices, including an erosion and sedimentation control plan.

Water quality protection is mandated by federal, state, and local regulations within the indirect effects area of influence. Water quality within the state of Texas is protected by Sections 401 and 402 of the Clean Water Act and the Texas Water Code. Section 401, Water Quality Certification of Federal Actions, requires that Best Management Practices be used to address erosion, sedimentation and post-construction total suspended solids control. The Cameron County Stormwater Management Plan addresses illicit discharge detection and elimination, as well as construction and post-construction stormwater management.

Proposed mitigation measures also include compensatory mitigation, such as the development of an area currently void of seagrasses in such a manner as to provide the hydrology, sediment and water quality to support the establishment of a seagrass bed. Compensatory mitigation would be used to mitigate for unavoidable direct and indirect shading impacts to the seagrass beds. The reestablishment of seagrass in propeller scarred areas would improve the seagrass habitat by restoring the beds to its original condition. Other mitigative measures such as public education/outreach, signage or the establishment of protection areas could also be incorporated into the mitigation plan.

Although indirect impacts alone (encroachment alteration, induced development, and effects related to induced development) to threatened and endangered species (NF-1) are not considered substantial, direct impact of the proposed project to ocelot/jaguarundi habitat and habitat connectivity is acknowledged. In response, proposed compensatory mitigation measures would include at-grade ocelot/jaguarundi underpasses (“wildlife crossings”) including associated fencing and, potentially, the acquisition of additional conservation land in the project area, offsetting connectivity impacts of the proposed roadway. These measures would be developed in consultation with the USFWS during roadway design, and would include fencing, when feasible, to minimize vehicle mortality of the ocelot accessing the underpasses.

Similarly, proposed mitigation for Piping Plover and Northern Aplomado Falcon could include acquisition, either through purchase or conservation easement of local lands not currently under the control of the resource agencies. This could be used to offset unavoidable impacts to falcon habitat and critical habitat of the Piping Plover; critical habitat north of the project area under

private ownership would be a viable opportunity for such an effort.

Artificial lighting would be limited to the bridge structure, intersections and where necessary for safety. Low-impact artificial lighting would be used to minimize potential lighting encroachment effects to wildlife, especially sea turtles. Directional, shielded light fixtures that focus illumination downward to the roadway surface while minimizing lighting of the surrounding area would be incorporated into the final design.

CHAPTER 6

CUMULATIVE IMPACTS

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CHAPTER 6

CUMULATIVE IMPACTS

This chapter examines the cumulative impacts of the proposed 2nd Access Project. The Council on Environmental Quality (CEQ) has established regulations for implementing provisions of the National Environmental Policy Act (NEPA). CEQ regulations direct agencies to assess the potential for project-related direct, indirect and cumulative impacts. This analysis follows the requirements and process outlined in 23 Code of Federal Regulations (CFR) 771, the Federal Highway Administration (FHWA) Technical Advisory 6640.8A, the Transportation Research Board's National Cooperative Highway Research Program Report 466: Desk Reference for Estimating the Indirect Effect of Proposed Transportation Projects (Transportation Research Board 2002), Considering Cumulative Impacts Under NEPA (CEQ 1997), Questions and Answers Regarding the Consideration of Past Actions in Cumulative Impacts Analysis (FHWA 2003), CEQ's memorandum Guidance on the Consideration of Past Actions in Cumulative Impacts Analysis (CEQ 2005) and the Texas Department of Transportation's (TxDOT) *Guidance on Preparing Indirect and Cumulative Impact Analyses* (September 2010).

6.1 TYPES OF IMPACTS: DIRECT, INDIRECT AND CUMULATIVE

As shown in **Table 6-1**, there are three types of impacts that may be caused by a roadway project: direct, indirect and cumulative.

Direct impacts are those impacts which are caused by the action and occur at the same time and place (40 CFR Section 1508.8). Indirect impacts are those impacts which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR Section 1508.8). CEQ regulations define a cumulative impact as an impact which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR Section 1508.7).

Table 6-1: Types of Direct, Indirect and Cumulative Impacts

Type of Impact	Direct	Indirect	Cumulative
Nature of Impact	Typical/Inevitable/Predictable	Reasonably Foreseeable/Probable	Reasonably Foreseeable/Probable
Cause of Impact	Project	Project's Indirect Impacts	Project's Direct and Indirect Impacts and Impacts of Other Activities
Timing of Impact	Project Construction and Implementation	At Some Future Time Other than Direct Impact	At Time of Project Construction, in the Future or in the Past
Location of Impact	At the Project Location	Within Boundaries of System Affected by the Project	Within Boundaries of System Affected by the Project

Source: National Cooperative Highway Research Program (2002)

Direct impacts are discussed and identified in **Chapter 4** and indirect impacts are discussed in **Chapter 5**. This **chapter** focuses on an analysis of cumulative impacts that were considered for the proposed project.

6.2 CUMULATIVE IMPACTS ANALYSIS METHODOLOGY

Relatively minor individual impacts may collectively result in significant cumulative impacts. Project-related direct and indirect impacts must be analyzed in the context of non-project-related impacts that may affect the same resources. Cumulative impacts are the incremental impacts that the project's direct or indirect impacts have on a resource in the context of the myriad of other past, present and future impacts on that resource from related or unrelated activities. This analysis of cumulative impacts relies heavily on past land use impacts, existing land use impacts, the anticipated land use changes expected to occur in the project area, and the impacts these changes would have on the resources considered in this analysis. As a result, land use serves as the background for cumulative impacts analysis and would not be considered a resource itself.

The evaluation process for each resource considered may be expressed in shorthand form as follows:

BASELINE CONDITION + PROJECT IMPACTS + FUTURE EFFECTS = CUMULATIVE IMPACTS
(historical and current) (direct and indirect) (reasonably foreseeable projects)

Unlike direct impacts, quantifying cumulative impacts may be difficult since a large part of the analysis requires an eye to the future and what may happen in the study area. The evaluation of cumulative impacts followed the eight steps in TxDOT's *Guidance on Preparing Indirect and Cumulative Impact Analyses* (September 2010). This eight-step approach was utilized to assess the potential cumulative impacts of the past, present and reasonably foreseeable actions on the resources in the proposed study area. The eight-step methodology from TxDOT's *Guidance* is depicted in **Table 6-2**.

Table 6-2: TxDOT Eight-Step Approach to the Cumulative Impact Analysis

Step No.	Step
1	Identify the resources to consider in the analysis.
2	Define the study area for each affected resource.
3	Describe the current status/viability and historical context for each resource.
4	Identify direct and indirect impacts of the project that might contribute to a cumulative impact.
5	Identify other reasonably foreseeable future effects.
6	Identify and assess cumulative impacts.
7	Report the results.
8	Assess the need for mitigation.

Source: TxDOT (June 2009)

6.2.1 Step 1: Identify Resources

All of the resource categories considered in this draft environmental impact statement were candidates for analysis with regard to indirect and cumulative impacts. The initial step of the cumulative impacts analysis uses information from the evaluation of direct and indirect impacts in the selection of environmental resources that should be evaluated for cumulative impacts. TxDOT's *Guidance* states: "If a project will not cause direct or indirect impacts on a resource, it will not contribute to a cumulative impact on the resource. The cumulative impact analysis should focus only on: (1) those resources significantly impacted by the project; and (2)

resources currently in poor or declining health or at risk even if the project impacts are relatively small (less than significant)." Similarly, CEQ guidance recommends narrowing the focus of the cumulative impacts analysis to important issues of national, regional or local significance.

Applying the foregoing criteria, the resources or environmental issues considered for cumulative impacts assessment are listed in **Table 6-3**. As recommended by CEQ guidance, specific indicators of each resource's condition are identified and shown. The use of indicators of a resource's health, abundance and/or integrity are helpful tools in formulating quantitative or qualitative metrics for characterizing overall impacts to resources. These indicators are also key aspects of each resource that have already been evaluated in terms of the project's direct and indirect impacts and facilitate greater consistency and objectivity in the analysis of cumulative impacts.

Table 6-3: Summary of Existing Resource Condition and Potential Impacts

Resource Category/ Issue		Summary of Existing Resource Condition and Potential Impacts			Additional Concerns Raised During Project Development	Project-Specific Permitting or Mitigation Necessary?	Cumulative Impact "Triggers"	
		Existing Condition/Current Health of Resource	Proposed Project Direct Impacts[1]	Indirect Impacts[1]			Would the resource be substantially impacted by the project?	Is the resource currently in poor or declining health or at risk even if anticipated impacts are less than substantial?
Land Use		Changing – Historically, a highly disturbed study area due to farming activities. The existing land use continues to change due to increasing development. Changing land use from undeveloped to developed could contribute to the decline in health of natural resources.	Conversion of 64.7 to 150.0 acres of undeveloped land to right-of-way (ROW); 90.1 to 158.5 acres of developed land to ROW; and 17.5 to 131.1 acres of agriculture/aquaculture land, depending on Build Alternative. Conversion would be consistent with all state and local government plans and policies.	Conversion of approximately 402.1 acres of undeveloped land to developed land by 2045 due to growth induced by the project. Induced development in the study area would be consistent with all state and local government plans and policies.	No concerns over impacts to this resource were raised during the scoping for this project.	No	Yes	Yes
Geology and Soils	Prime Farmland Impacts	Farmland Resources are declining – Cameron County prime farmland, which is located on the mainland only, would continue to be converted to developed lands due to growth.	Conversion of 0.1 to 59.1 acres of prime farmland to ROW, depending on Build Alternative. Completion of the formal CPA-106 Natural Resources Conservation Service form indicates no substantial direct impacts to prime farmland from any of the build alternatives.	Conversion of approximately 162.3 acres of undeveloped land to developed land on the mainland by 2045 could occur from growth induced by the 2nd Access Project. Of this, approximately 11.4 acres of prime farmland could be impacted by induced growth. However, virtually no prime farmland soils series occurs in the Laguna Vista or Port Isabel areas, where induced growth is anticipated.	No concerns over impacts to this resource were raised during the scoping for this project.	No	No	Yes. The resource is currently declining. No. The resource is not at risk from the 2nd Access Project.

Table 6-3: Summary of Existing Resource Condition and Potential Impacts

Resource Category/ Issue		Summary of Existing Resource Condition and Potential Impacts			Additional Concerns Raised During Project Development	Project-Specific Permitting or Mitigation Necessary?	Cumulative Impact "Triggers"	
		Existing Condition/Current Health of Resource	Proposed Project Direct Impacts[1]	Indirect Impacts[1]			Would the resource be substantially impacted by the project?	Is the resource currently in poor or declining health or at risk even if anticipated impacts are less than substantial?
Community and Social Resources	Community Cohesion Quality of Life Relocation Environmental Justice Public Resources Public Safety Traffic Travel Patterns and Accessibility	Changing - Rural lifestyle is being replaced by expanding Brownsville, Laguna Vista and surrounding areas.	Beneficial impacts to traffic, travel patterns and accessibility (improved access to South Padre Island), and public safety. Minor negative impacts to community cohesion from tolling of the 2nd Access Project Laguna Madre crossing. Minor public resources impacts from visual intrusion and increased traffic. Minor environmental justice impacts from increased noise levels, from visual impacts and from construction impacts; overall benefits to Environmental Justice population from improved public safety, mobility and access. The passage of Title VI of the Civil Rights Act of 1964 ensures that "No person in the United States shall, on the ground of race, color, or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance."	No substantial indirect impacts anticipated to community cohesion, public resources, public safety, traffic, travel patterns, or access. No disproportional indirect impacts anticipated to environmental justice populations with regard to any of the above Community and Social Resources.	No concerns over impacts to this resource were raised during the scoping for this project.	Yes, for Community Cohesion and Quality of Life. Refer to Chapter 7 for mitigation proposed for direct and indirect impacts to these community and social resources.	No	No
Relocation and Displacement Impacts		-	0-1 residential displacements, 0-1 commercial displacements (depending on Build Alternative)	-	No additional concerns over project relocations were raised during the scoping for this project.	Yes. Refer to Chapter 7 for mitigation proposed for direct and indirect impacts regarding displacements and relocations.	No	No
Regional Economy		Poor – Currently, the regional economy of Cameron County is lagging behind the rest of the state and experiences a high unemployment rate as a result of the economic downturn. In recent history, Cameron County experienced a higher job growth rate compared to the rest of the state. However, unemployment rates have been higher than the rest of the state.	The proposed 2nd Access Project is expected to add approximately 2,583 direct and indirect jobs to the RSA by 2045. This effect would be approximately the same for all build alternatives.		The economic impacts of the project were not identified as a concern by the general public, the resource agencies, or the Study Team's technical experts. Cameron County identified potential economic effects as beneficial	No	Yes	Yes. The current health of the regional economy is poor.

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Resource Category/ Issue		Summary of Existing Resource Condition and Potential Impacts			Additional Concerns Raised During Project Development	Project-Specific Permitting or Mitigation Necessary?	Cumulative Impact "Triggers"	
		Existing Condition/Current Health of Resource	Proposed Project Direct Impacts[1]	Indirect Impacts[1]			Would the resource be substantially impacted by the project?	Is the resource currently in poor or declining health or at risk even if anticipated impacts are less than substantial?
Traffic Noise Impacts		Changing – Existing land use and traffic conditions continue to change due to increasing development. These changes could contribute to the rise in ambient noise levels.	No noise receivers impacted by proposed project.	Future increases in ambient noise levels associated with projected induced development are anticipated. The network of future roadways and subdivision streets would be expected to contribute to increased ambient noise levels.	Concerns over traffic noise impacts were raised during the scoping for this project with regard to potential impacts to migratory birds (see below).	No	No	No
Air Quality Impacts	CO and Ozone Impacts on 8-hour Ozone Standard MSAT	Stable - Cameron County is in attainment of all NAAQS.	It is unlikely that a carbon monoxide standard would ever be exceeded as a result of any project with an average daily traffic below 140,000 vehicles per day. The average daily traffic projections for the project do not exceed 140,000 vehicles per day. The qualitative assessment provided is relative to the various alternatives of MSAT emissions and has acknowledged that the build alternatives for the proposed project may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain, and because of this uncertainty, the health effects from these emissions cannot be estimated. Construction may temporarily degrade air quality through dust and exhaust gases associated with construction equipment.	Decrease in congestion on existing roadways systems would likely benefit air quality. Any new transportation projects induced by the 2nd Access Project would be required to be analyzed for potential air quality impacts. No change in attainment status is anticipated within the area of influence as the result of emissions associated with the proposed project. Indirect air quality impacts from MSAT are unquantifiable due to existing limitations to determine pollutant emissions, dispersion, and impacts to human health. Emissions would likely be lower than present levels in future years as a result of the EPA's national control regulations (i.e., new light-duty and heavy duty on road fuel and vehicle rules, the use of low sulfur diesel fuel. Even with an increase in vehicle miles traveled and possible temporary emission increases related to construction activities, the EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions of on road emissions, MSATs, and the ozone precursors VOC and NOx. The proposed project is not anticipated to result in indirect air quality impacts.	No concerns over impacts to air quality were raised during the scoping for this project.	Yes. Refer to chapter 7 for details regarding measures to control fugitive dust and other air quality issues.	No	No

Table 6-3: Summary of Existing Resource Condition and Potential Impacts

Resource Category/ Issue	Summary of Existing Resource Condition and Potential Impacts			Additional Concerns Raised During Project Development	Project-Specific Permitting or Mitigation Necessary?	Cumulative Impact "Triggers"	
	Existing Condition/Current Health of Resource	Proposed Project Direct Impacts[1]	Indirect Impacts[1]			Would the resource be substantially impacted by the project?	Is the resource currently in poor or declining health or at risk even if anticipated impacts are less than substantial?
Mobile Source Air Toxics: Air toxins load	Improving - Air Toxins are Decreasing through 2020. MSAT will continue to improve over time due to dramatic improvements in vehicle technology and fuels and traffic flow improvements realized over time.	Localized increases in MSAT concentrations would likely be most pronounced along the expanded roadway sections that would be built along developed commercial and residential areas and major intersections, such as the proposed 2nd Access Project and FM 510. The magnitude and the duration of potential increases compared to the No-Build Alternative cannot be accurately quantified due to the inherent deficiencies of current models. Localized level of MSAT emissions for the Build alternatives could be higher relative to the No-Build Alternative and could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be substantially lower than today.	MSAT will most likely increase due to the induced development and result in new on-road, off-road, area and point sources within the indirect impact study area. However, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be substantially lower than today.	No concerns over MSAT levels were raised during the scoping for this project.	No	No	No

Table 6-3: Summary of Existing Resource Condition and Potential Impacts

Resource Category/ Issue		Summary of Existing Resource Condition and Potential Impacts			Additional Concerns Raised During Project Development	Project-Specific Permitting or Mitigation Necessary?	Cumulative Impact "Triggers"	
		Existing Condition/Current Health of Resource	Proposed Project Direct Impacts[1]	Indirect Impacts[1]			Would the resource be substantially impacted by the project?	Is the resource currently in poor or declining health or at risk even if anticipated impacts are less than substantial?
Water Quality		Poor. Watersheds within the RSA contain streams listed on the 2010 303(d) List of Impaired Waters, as discussed in Chapter 3. Arroyo Colorado Tidal: 3 Segments Impaired Arroyo Colorado Above Tidal: 3 Segments Impaired Rio Grande Below Falcon Reservoir: 1 Segment Impaired Laguna Madre: 1 Segment Impaired Gulf of Mexico: 2 Segments Impaired Port Isabel Fishing Harbor: 1 Segment Impaired Brownsville Ship Channel: 1 Segment Impaired Unnamed Drainage Ditch Tributary (B) in Cameron County Drainage District #3: 1 Segment Impaired Unnamed Drainage Ditch Tributary (B) to S. Arroyo Colorado: 1 Segment Impaired	Increase of impervious surfaces by 9.9 to 36.7 acres, depending on the build alternative. Project construction would result in temporary increase in sedimentation and turbidity.	For the mainland and island sections of the project, permanent best management practices would minimize water quality impacts from stormwater runoff or spills from the project roadway. No permanent best management practices are proposed for the Laguna Madre crossing component of the project. This would result in an increase in impervious cover and greater volumes of runoff with roadway pollutants affecting the Laguna Madre during storm events. Accidental spills on the causeway could result in contaminants introduced to the Laguna Madre. By 2045, approximately 402.1 acres of undeveloped land (maximum of 0.06 percent of undeveloped land in the study area) could be converted to residential and commercial use above the No-Build Alternative, with associated increases in impervious cover. New residential development would also result in new municipal discharges from sewage treatment facilities and storm water runoff from new off-system roadways.	No concerns over impacts to surface water quality were raised during the scoping for this project except in association with impacts to wetlands (see below).	Yes. Construction impacts would be minimized through the incorporation of appropriate best management practices for erosion control, as discussed in chapter 7.	Potentially, from hazardous materials spills on the 2nd Access Project Laguna Madre crossing component.	Yes
Floodplain Impacts		Stable - Flooding in Cameron County area continues to be an issue. 209,912 acres of 100-year floodplain on mainland; Almost all South Padre Island is 100-year floodplain (25,734 acres). Changes in land use due to suburban growth are expected to result in encroachment of the 100-year floodplain.	162.9 to 359.3 acres of encroachment to the 100-year floodplain, depending on alternative. The proposed project would not increase the base flood elevation to a level that would violate applicable floodplain regulations or ordinances.	By 2045, there is potential for encroachment to approximately 330.0 acres of 100-year floodplains from induced development acres. Induced development would result in an increase in impervious cover and greater volumes of runoff during storm events, potentially affecting flood elevations.	No concerns over impacts to flood elevations were raised during the scoping for this project.	Yes. Refer to Chapter 7 for details regarding proposed mitigation.	No	No
Waters of the U.S.	Freshwater Wetlands	Declining – According to the EPA, there were 60,000 acres per year of wetland losses in 2004. Continued changes in land use due to development are expected to convert more wetlands to non-wetlands.	6.0 to 38.1 acres to freshwater wetlands and 0.0 to 110.9 acres of lakes and ponds, depending on the build alternative.	By 2045, approximately 402.1 acres of undeveloped land (maximum of 0.07 percent of undeveloped land in the study area) could be converted to residential and commercial use above the No-Build Alternative, with associated potential for impacts up to 13.6 acres of freshwater wetlands.	Freshwater wetland resources were identified by technical experts as a major environmental concern associated with the proposed project.	Yes. Refer to Chapter 7 for mitigation proposed for direct impacts.	No	Yes
Waters of the U.S.	Estuarine Wetlands	Declining - Continued changes in land use due to development are expected to convert more wetlands to non-wetlands.	5.1 to 19.8 acres of estuarine wetland (saltmarsh and mudflats/sand flats) depending on the build alternative.	Approximately 402.1 acres of undeveloped land (maximum of 0.2 percent of undeveloped land in the study area) could be converted to residential and commercial use above the No-Build Alternative, with associated potential for impacts up to 32.6 acres of estuarine wetlands.	Estuarine wetland resources were identified by technical experts as a major environmental concern associated with the proposed project.	Yes. Refer to Chapter 7 for proposed mitigation.	No	Yes

Table 6-3: Summary of Existing Resource Condition and Potential Impacts

Resource Category/ Issue		Summary of Existing Resource Condition and Potential Impacts			Additional Concerns Raised During Project Development	Project-Specific Permitting or Mitigation Necessary?	Cumulative Impact "Triggers"	
		Existing Condition/Current Health of Resource	Proposed Project Direct Impacts[1]	Indirect Impacts[1]			Would the resource be substantially impacted by the project?	Is the resource currently in poor or declining health or at risk even if anticipated impacts are less than substantial?
Vegetation (non-regulatory) and Wildlife (not including threatened, endangered, or rare species) and their non-regulated habitats	Thorn-scrub brush, riparian, rangeland, fence line vegetation and terrestrial wildlife	Declining - Changes in land use due to suburban growth are expected to convert more of the existing vegetation to developed land; however, extensive conservation lands exist for native vegetation. Declining - Many wildlife species in the RSA are restricted to the Lower Rio Grande Valley. While impacts to individual plants or animals (non-regulated wildlife species) may occur, population impacts are not anticipated. Changes in land use due to suburban growth are expected to convert more of the available wildlife habitat to other uses; however, extensive wildlife habitat occurs in existing conservation lands.	139.7 to 291.8 acres of thorn-scrub, riparian, rangeland and fence line habitat, depending on the build alternative. Direct impacts associated with the project could include loss of habitat and habitat fragmentation affecting wildlife.	Indirect impacts associated with the project could include an increase in wildlife mortality associated with vehicle collisions. Indirect impacts to wildlife include loss of habitat and or habitat fragmentation. By 2045, approximately 402.1 acres of undeveloped land could be converted to residential and commercial use above the No-Build Alternative, with associated potential for impacts up to 62.2 acres of wildlife habitat.	Non-regulatory habitat/native vegetation and general wildlife impacts were identified by technical experts as a major environmental concern associated with the proposed project.	Non-regulatory vegetation mitigation will be negotiated. Refer to Chapter 7 for proposed potential mitigation.	Yes	Yes

Table 6-3: Summary of Existing Resource Condition and Potential Impacts

Resource Category/ Issue		Summary of Existing Resource Condition and Potential Impacts			Additional Concerns Raised During Project Development	Project-Specific Permitting or Mitigation Necessary?	Cumulative Impact "Triggers"	
		Existing Condition/Current Health of Resource	Proposed Project Direct Impacts[1]	Indirect Impacts[1]			Would the resource be substantially impacted by the project?	Is the resource currently in poor or declining health or at risk even if anticipated impacts are less than substantial?
Vegetation	Rare Vegetation Series (S1, S2, S3) and Seagrass	Declining - Changes in land use due to suburban growth are expected to convert more of the existing areas of remnant native vegetation (thorn-scrub brush, rangeland, wetland), potentially containing rare vegetation series, to developed land; Rare vegetation occurring on private lands is not protected and may be subject to development impacts. Extensive conservation lands exist in the RSA; however, not all lands in conservation contain rare vegetation series. Seagrass is declining; however, some protection is afforded by substantial stakeholder (commercial, conservation) interest.	No direct impacts to Texas Ebony-Anacua series for all build alternatives. 0 to 50.32 acres of Seacoast Bluestem-Gulfdune Paspalum, depending on alternative; and 0 to 0.1 acres of Black mangrove for 7 alternatives (no impacts for 4 alternatives) would be directly impacted depending on the build alternative. Direct impacts to the seagrasses would range from 27.6 to 47.9 acres by alternative.	Indirect impacts range from 45.0 to 97.0 acres of seagrass from shading by the bridge structure, depending on the alternative. Seagrass would be indirectly affected by modification of currents in the Laguna Madre, resulting in scouring of the bay floor and an alteration of the existing suspended sediment regime and from increased access to portions of the Laguna Madre resulting in increased recreational boating, leading to increased prop scars in seagrass beds. By 2045, approximately 402.1 acres of undeveloped land (maximum of 0.05 percent of undeveloped land in the study area) could be converted to residential and commercial use above the No-Build Alternative. This development would likely lead to increased recreational boating and associated damage to seagrass beds. While the Laguna Madre portion of the RSA is largely undevelopable (Laguna Madre and Gulf open water), approximately 402.1 acres of undeveloped adjacent land could be converted to residential and commercial use above the No-Build Alternative, with associated increases in impervious cover and runoff into the Laguna Madre. New municipal discharges from sewage treatment facilities and storm water runoff from new off-system roadways would also affect Laguna Madre habitat. No permanent best management practices are proposed for the Laguna Madre bridge component of the project. This would result in an increase in impervious cover over the Laguna Madre and greater volumes of runoff with associated roadway pollutants, especially during storm events, potentially affecting the Laguna Madre seagrass beds. Accidental spills on the causeway could result in contaminants introduced to the Laguna Madre, potentially affecting seagrass.	Resource agencies and local organizations identified impacts to rare vegetation and Laguna Madre seagrass beds as concerns.	Yes. Substantial impacts from induced development, however, would not be anticipated due to implementation of construction and permanent best management practices during land development activities. Refer to Chapter 7 for details regarding proposed mitigation.	Significant direct impacts to rare vegetation series are not anticipated; however, there is potential for substantial indirect impacts. . Potential significant impacts to seagrass beds.	Yes

Table 6-3: Summary of Existing Resource Condition and Potential Impacts

Resource Category/ Issue		Summary of Existing Resource Condition and Potential Impacts			Additional Concerns Raised During Project Development	Project-Specific Permitting or Mitigation Necessary?	Cumulative Impact "Triggers"	
		Existing Condition/Current Health of Resource	Proposed Project Direct Impacts[1]	Indirect Impacts[1]			Would the resource be substantially impacted by the project?	Is the resource currently in poor or declining health or at risk even if anticipated impacts are less than substantial?
Migratory Birds	Neotropical migrant songbirds; Waterfowl, Shorebirds, Wading Birds and Rookeries	Declining - Changes in land use due to suburban growth are expected to convert more of the existing areas of migratory bird habitat (thorn-scrub brush, rangeland, dune, and wetland); however, extensive conservation lands for neotropical migrant songbirds, shorebirds, and wading birds exist in the RSA, including Laguna Madre spoil islands, where wading bird rookeries occur and some of which are designated as Piping Plover critical habitat.	Approximately 263.3 to 389.7 acres of potential migratory bird habitat (thorn-scrub brush, rangeland, wetland, seagrasses, dune, ponds and lakes, excluding the Laguna Madre) would be directly impacted depending on the build alternative. Up to 13.9 acres of piping plover habitat would be directly impacted depending on the build alternative. No impacts to rookeries are anticipated from any build alternative.	By 2045, approximately 402.1 acres of undeveloped land would be converted to residential and commercial use above the No-Build Alternative, with associated potential for impacts up to 402.1 acres of terrestrial migratory bird habitat (thorn-scrub brush, rangeland, wetland, dune). Of these 402.1 acres, approximately 20.2 acres of piping plover habitat and approximately 12.4 acres of USFWS-designated piping plover critical habitat would be converted to residential and commercial use from induced development. Indirect impacts to spoil island colonial wading bird rookeries and waterfowl could consist of loss of habitat effectiveness from traffic noise and vehicle activity from operation and maintenance of the 2nd Access Project Laguna Madre crossing. Birds would be expected to habituate to some degree to these activities. No permanent best management practices are proposed for the Laguna Madre crossing component of the project. This would result in an increase in impervious cover and greater volumes of runoff with roadway pollutants affecting the Laguna Madre, including shorebird and waterfowl habitat, during storm events. Accidental spills on the causeway could result in contaminants introduced to the Laguna Madre. These factors could affect the integrity of waterfowl and wading bird rookery habitat. In conjunction with induced development and associated increase in impervious cover, there is potential for increased pollutant runoff into the Laguna Madre, possibly affecting the quality of Laguna Madre waterfowl habitat. Substantial impacts of this type; however, would not be anticipated due to implementation of development best management practices during associated land development activities.	Resource agencies and local organizations identified migratory songbirds, waterfowl, shorebirds and colonial wading birds, including their rookeries, as important resources.	Yes, in reference to seagrass beds (waterfowl habitat component). Refer to Chapter 7 for details regarding proposed mitigation.	Yes	Yes

Table 6-3: Summary of Existing Resource Condition and Potential Impacts

Resource Category/ Issue		Summary of Existing Resource Condition and Potential Impacts			Additional Concerns Raised During Project Development	Project-Specific Permitting or Mitigation Necessary?	Cumulative Impact "Triggers"	
		Existing Condition/Current Health of Resource	Proposed Project Direct Impacts[1]	Indirect Impacts[1]			Would the resource be substantially impacted by the project?	Is the resource currently in poor or declining health or at risk even if anticipated impacts are less than substantial?
Essential Fish Habitat	Essential Fish Habitat	Declining - Changes in adjacent land use due to suburban growth are expected to increase potential for degradation of Laguna Madre and Gulf water quality with associated potential for degradation of RSA habitats fish species. However, water quality best management practice requirements for development of adjacent land, as well as state-ownership of Laguna Madre waters, designation of RSA as Essential Fish Habitat, private conservation efforts and general public awareness of importance of conservation of Laguna Madre habitat integrity, serve to conserve RSA essential fish habitat quality.	Direct impacts to seagrasses would range from 27.6 to 47.9 acres depending on the build alternative. Also, increased suspended sediments due to construction activities would also represent potential impacts to essential fish habitat. Small areas of permanent disturbance of seafloor benthic community through replacement of soft-bottom benthic habitats with bridge columns. Columns could provide structures and serve as reef-building areas, potentially serving as an attractant to many fish species. Populations of species not typically associated with the open Laguna Madre could potentially become established.	Indirect impacts to 45.0 to 97.0 acres of seagrass from shading by the bridge structure, depending on the alternative. Indirect impacts also include introduction of a new element to essential fish habitat, namely, bridge pilings. No permanent best management practices are proposed for the Laguna Madre crossing component of the project. This would result in an increase in impervious cover and greater volumes of runoff with roadway pollutants affecting Laguna Madre essential fish habitat during storm events. Accidental spills on the causeway could result in contaminants introduced to the Laguna Madre. These factors could affect the integrity of essential fish habitat. While the RSA is largely undevelopable (Laguna Madre and Gulf open water), approximately 402.1 acres of undeveloped land in the study area) of adjacent land could be converted to residential and commercial use above the No-Build Alternative, with associated increases in impervious cover and runoff into the Laguna Madre. This development would likely lead to increased recreational boating and associated damage to seagrass beds and other essential fish habitat. New municipal discharges from sewage treatment facilities and storm water runoff from new off-system roadways would also affect Laguna Madre habitat. Substantial impacts from induced development; however, would not be anticipated due to implementation of construction and permanent best management practices.	Resource agencies and local organizations identified impacts to essential fish habitat and associated fisheries as concerns.	Yes. Refer to Chapter 7 for proposed mitigation.	Yes, due to possible estuary impacts (Laguna Madre) affecting estuary-dependent species	Yes

Table 6-3: Summary of Existing Resource Condition and Potential Impacts

Resource Category/ Issue		Summary of Existing Resource Condition and Potential Impacts			Additional Concerns Raised During Project Development	Project-Specific Permitting or Mitigation Necessary?	Cumulative Impact "Triggers"	
		Existing Condition/Current Health of Resource	Proposed Project Direct Impacts[1]	Indirect Impacts[1]			Would the resource be substantially impacted by the project?	Is the resource currently in poor or declining health or at risk even if anticipated impacts are less than substantial?
Threatened and Endangered Species and State –Listed Rare Species	Mainland Threatened and Endangered Species including ocelot, jaguarundi, and Northern Aplomado Falcon	Declining - Changes in land use due to suburban growth are expected to convert more of the existing areas of remnant native vegetation (thorn-scrub brush, rangeland and freshwater wetland), potentially containing threatened and endangered species and rare species, to developed land. The resulting fragmentation of Ocelot/Jaguarundi habitat by roads is accompanied by loss of connectivity between remaining habitat patches. There is insufficient protected ocelot/jaguarundi habitat to recover these species. An estimated 95 percent of Northern Aplomado Falcon habitat in the lower Rio Grande valley has been lost. Additional direct and indirect losses and ongoing area-wide habitat loss impedes recovery of these species. Extensive conservation lands exist in the RSA; however, only a portion is suitable habitat for threatened and endangered species	132.0 to 291.9 acres of thorn-scrub, rangeland and freshwater wetland habitat, depending on the build alternative (potential habitat for threatened or endangered species or rare species; 135.5 to 248.1 acres of Northern Aplomado Falcon habitat; 4.8 to 119.3 acres ocelot/jaguarundi habitat). Loss of potential habitat and habitat fragmentation potentially affecting threatened or endangered species or rare species. The project may affect one rare plant species, may adversely affect two federally-endangered mammals and one federally-endangered bird, and may affect, but is not likely to adversely affect 26 endangered, threatened, or rare species.	By 2045, approximately 162.3 acres of undeveloped land could be converted to residential and commercial use above the No-Build Alternative, with associated potential for impacts up to 82.9 acres of ocelot/jaguarundi habitat and/or up to 154.0 acres of Northern Aplomado Falcon habitat.	Resource agencies and local organizations identified impacts to threatened or endangered species or rare species as concerns.	Yes, for unavoidable impacts. Refer to Chapter 7 for proposed potential mitigation.	Potential substantial impacts to mainland threatened and endangered species, especially ocelot and Northern Aplomado Falcon	Yes

Table 6-3: Summary of Existing Resource Condition and Potential Impacts

Resource Category/ Issue		Summary of Existing Resource Condition and Potential Impacts			Additional Concerns Raised During Project Development	Project-Specific Permitting or Mitigation Necessary?	Cumulative Impact "Triggers"	
		Existing Condition/Current Health of Resource	Proposed Project Direct Impacts[1]	Indirect Impacts[1]			Would the resource be substantially impacted by the project?	Is the resource currently in poor or declining health or at risk even if anticipated impacts are less than substantial?
Threatened and Endangered Species and State –Listed Rare Species	Laguna Madre and Gulf of Mexico Threatened and Endangered Species, including Brown Pelican and Kemp's ridley, loggerhead, and green sea turtles	Declining - Changes in adjacent land use due to suburban growth are expected to increase potential for degradation of Laguna Madre and Gulf water quality with associated potential for degradation of RSA habitats for threatened and endangered species and rare species. However, Endangered Species Act requirements; water quality best management practice requirements for development of adjacent land; designation of RSA as Essential Fish Habitat; designation of 5,080.6 acres Piping Plover critical habitat and; public and private conservation efforts all combine to facilitate preservation of RSA habitat quality. It should be noted; however, that none of these measures prevent development impacts from occurring. Moreover, private lands are not protected from development impacts to threatened and endangered species or to designated critical habitat. The threat of ongoing impacts and habitat loss impedes recovery of these species.	Direct impacts to the seagrasses would range from 27.6 to 47.9 acres and vary by alternative. Direct impacts to sea turtle and manatee habitat would range from 72.8 to 113.3 acres and vary by alternative. Direct impacts to Piping Plover critical habitat would range from 0.0 to 13.93 acres, depending on alternative. Direct impacts to Laguna Madre from placement of pilings and increased suspended sediments due to construction-related sediment disturbing activities. The project may adversely affect one federally-endangered bird and may affect, but is not likely to adversely affect, 13 endangered, threatened, or rare species.	Approximately 45.0 to 97.0 acres of indirect seagrass impacts (shading from bridge structure) would occur, depending on build alternative, Seagrass is a primary habitat feature of Laguna Madre threatened or endangered species or rare species. Approximately 20.2 acres of Piping Plover habitat and 12.4 acres of Piping Plover critical habitat indirectly impacted by project. Other habitat effects are modification of currents in the Laguna Madre from bridge columns, resulting in scouring of the bay floor and an alteration of the existing suspended sediment regime. No permanent best management practices are proposed for the Laguna Madre crossing component of the project. This would result in an increase in impervious cover and greater volumes of runoff with roadway pollutants affecting Laguna Madre threatened and endangered species habitats during storm events. Accidental spills on the causeway could result in contaminants introduced to the Laguna Madre. These factors could affect the integrity of Laguna Madre habitat. While the RSA is largely undevelopable (Laguna Madre and Gulf open water), a maximum of approximately 402.1 acres of adjacent undeveloped land could be converted to residential and commercial use above the No-Build Alternative, with associated increases in impervious cover and runoff into the Laguna Madre. This development would likely lead to increased recreational boating and associated damage to seagrass beds. New municipal discharges from sewage treatment facilities and storm water runoff from new off-system roadways would also affect Laguna Madre habitat. Substantial impacts from induced development; however, would not be anticipated due to implementation of construction and permanent best management practices.	Resource agencies and local organizations identified impacts to threatened or endangered species or rare species as concerns.	Yes. Refer to Chapter 7 for proposed mitigation.	Potential substantial impacts to threatened and endangered sea turtles and Piping Plover. As noted by the USFWS, potentially substantial effects to ocelot/jaguarundi, which utilize habitats associated with the Laguna Madre, could also occur.	Yes

Table 6-3: Summary of Existing Resource Condition and Potential Impacts

Resource Category/ Issue		Summary of Existing Resource Condition and Potential Impacts			Additional Concerns Raised During Project Development	Project-Specific Permitting or Mitigation Necessary?	Cumulative Impact "Triggers"	
		Existing Condition/Current Health of Resource	Proposed Project Direct Impacts[1]	Indirect Impacts[1]			Would the resource be substantially impacted by the project?	Is the resource currently in poor or declining health or at risk even if anticipated impacts are less than substantial?
Threatened and Endangered Species and State –Listed Rare Species	South Padre Island Threatened and Endangered Species	Declining - Changes in land use due to suburban growth are expected to convert more of the existing areas of remnant native habitat (dune and mud/salt flat wetland), potentially containing threatened and endangered species and rare species, to developed land; however, extensive conservation lands exist in the RSA.	5.1 to 70.1 acres of dune and mud/salt flat wetland habitat, depending on the build alternative (potential habitat for threatened or endangered species or rare species). Direct impacts to potential sea turtle nesting dune habitat would range from 0.0 to 50.3 acres of and vary by alternative. Direct impacts to Piping Plover critical habitat would range from 0.0 to 13.93 acres, depending on alternative. Loss of potential habitat and habitat fragmentation potentially affecting threatened or endangered species or rare species. The project may adversely affect one federally-endangered bird and may affect, but is not likely to adversely affect, seven endangered, threatened, or rare species.	Approximately 239.8 acres of undeveloped land could be converted to residential and commercial use above the No-Build Alternative, with associated potential for impacts up to 239.8 acres of 20.2 acres of Piping Plover habitat, up to 12.4 acres of USFWS-designated Piping Plover critical habitat, and/or up to 0.5 acre of sea turtle nesting habitat.	Resource agencies and local organizations identified impacts to threatened or endangered species or rare species as concerns.	Yes. Refer to Chapter 7 for proposed mitigation.	Potential substantial impacts to threatened and endangered species, especially Piping Plover and loggerhead, Kemp's ridley, and green sea turtles	Yes
Threatened and Endangered Species and State –Listed Rare Species	Piping Plover	Declining - Changes in land use due to suburban growth are expected to convert more of the existing areas of remnant habitat (beach and mud/salt flat wetland), potential habitat, to developed land; however, extensive conservation lands and critical habitat exist along the Laguna Madre and on South Padre Island.	0.0 to 13.9 acres of critical habitat, depending on the build alternative. Habitat fragmentation. The project may adversely affect, and is likely to adversely affect the Piping Plover.	Approximately 402.1 acres of undeveloped land could be converted to residential and commercial use above the No-Build Alternative, with associated potential for impacts up to 20.2 acres of potential Piping Plover habitat, including 12.4 acres of USFWS-designated Piping Plover critical habitat.	Resource agencies and local organizations identified impacts to threatened or endangered species or rare species as concerns.	Yes. Refer to Chapter 7 for proposed mitigation.	Potential substantial impacts to Piping Plover	Yes

Table 6-3: Summary of Existing Resource Condition and Potential Impacts

Resource Category/ Issue	Summary of Existing Resource Condition and Potential Impacts			Additional Concerns Raised During Project Development	Project-Specific Permitting or Mitigation Necessary?	Cumulative Impact "Triggers"	
	Existing Condition/Current Health of Resource	Proposed Project Direct Impacts[1]	Indirect Impacts[1]			Would the resource be substantially impacted by the project?	Is the resource currently in poor or declining health or at risk even if anticipated impacts are less than substantial?
Cultural Resource Impacts	Stable to Declining - A continuing change in land use from rural to suburban setting is expected to encroach and disturb known and unknown cultural resource sites.	No non-archeological historic-age resources identified within the area of potential effect were recommended eligible for inclusion in the NRHP. Therefore there is no potential to directly affect any NRHP eligible resources. No previously recorded archeological sites were identified within the 2nd Access Project alternative area of potential effect.	No NRHP-eligible non-archeological historic-age resources were identified within the area of potential effect. Therefore, there is no potential for adverse visual, audible, or atmospheric effects to any historic structure. There is a possibility for indirect impacts from induced development to historic structural or archeological resources in the study area, as land is converted to residential and commercial uses. Development in the floodplain would be minimized, thereby protecting the areas with some of the greatest potential for archeological resources.	No concerns over impacts to non-archeological historic age resources or archeological resources were raised during the scoping for this project.	Yes, for accidental discovery of archeological resources. No mitigation required for non-archeological cultural resources.	No	No
Visual and Aesthetic Impacts	Changing - Transition from a rural to suburban/developed landscape	The proposed project would be predominately above grade bridge and approach structures. Low to moderately high adverse changes to key views, depending on key view location and Build Alternative.	Increases in nighttime ambient light levels would not result in appreciable increases beyond that anticipated under the No-Build Alternative.	Concerns over visual and aesthetic impacts were identified as a concern during the scoping for this project. Specific concerns were expressed regarding the visual impacts of a second causeway over the Laguna Madre.	Yes. Refer to Chapter 7 for proposed mitigation.	No	No

Source: HNTB (2009)
Notes: 1. Acreages and other data are approximate estimates and are based on information presented in Chapters 4 and 5.
2. Acreages and other data are approximate, based on information from *Proposed South Padre Island Second Access Project Economic Analysis,* Cameron County GIS data, the City of Brownsville's Imagine *Brownsville Comprehensive Plan,* Brownsville and Harlingen-San Benito Metropolitan Planning Organization 2030 Metropolitan Transportation Plans, the *South Padre Island Comprehensive Plan* (2008) and the City of Port Isabel *Comprehensive Plan* (2005) and information from agency representatives and results of various stakeholder meetings.

As documented in **Chapters 4** and **5**, it was determined that the proposed action would not have considerable direct or indirect impacts on the following resources: direct or regional land use; geology and soils including prime farmland; community and social resources including neighborhoods, residential areas, community cohesion, social groups, environmental justice populations, traffic and public safety, travel patterns and access; traffic noise levels, air quality, floodplains, vegetation and wildlife (not rare, threatened, or endangered); cultural resources including archeological and historic structural resources; hazardous materials; visual and aesthetic quality; or energy resources. The project may substantially impact economic conditions in Cameron County; therefore regional economics is included in cumulative impacts analysis. The following resources in the study area, although not substantially impacted by the project, may be considered to be in poor or declining health or alternatively of national, regional, or local significance, and therefore warrant inclusion in cumulative impacts analysis: surface water quality, freshwater wetlands, estuarine wetlands, threatened and endangered species and State-listed Rare Species, rare vegetation series and seagrass, essential fish habitat and migratory birds, including rookeries. To facilitate analysis, threatened and endangered species and rare species were separated into three geographic groups – mainland species, Laguna Madre species and Padre Island species.

6.2.2 Step 2: Define Resource Study Areas (RSAs)

In Step 2, a resource-specific study area is defined for each resource. The setting of spatial limits for the study of each resource, a resource study area (RSA), also known as "zone of potential impact", was established using TxDOT/CEQ criteria, and in consideration of each resource's physical characteristics, biological relationships (for example, habitat availability for a given species) and regulatory jurisdictions. The use of indicators of a resource's health, abundance and/or integrity are helpful tools in formulating quantitative or qualitative metrics for characterizing overall effects to resources. These indicators are also key aspects of each resource that have already been evaluated in terms of the project's direct and indirect impacts, and facilitate greater consistency and objectivity in the analysis of cumulative effects. Development, political and management realities for each resource are also taken into consideration. The geographic study area is described below for each resource considered in the analysis.

Regional Economics RSA - The Cameron County government plays a decisive role in factors affecting economic activity within the county. These include development regulations, property tax rates, and transportation planning. The Cameron County Regional Mobility Authority (CCRMA) also plays a significant role in major transportation project planning within the county. Local access afforded by these projects affects business development and associated employment opportunities and economic development at a county level. As a result, the RSA for regional economics is Cameron County (**Exhibit 6-1**).

A watershed represents a bounded hydrologic system where natural resources such as surface water and wildlife are interconnected and integrated, At smaller scales (such as a County), the watershed habitat types and associated wildlife populations are fairly homogeneous; therefore, inferences about wildlife occurrence may be drawn from examination of habitats within the watershed. Consequently, the RSAs for natural resources (freshwater wetlands, estuarine wetlands, threatened and endangered species, essential fish habitat, migratory birds, and rare vegetation series/seagrass) are watershed-based. Because it is located in the coastal plain, the Cameron County mainland is very flat, with little topographic relief and, as a result, few major natural water courses drain large areas.

Most of Cameron County is bounded by three water bodies, the Arroyo Colorado, the Rio Grande, and the Gulf of Mexico. The eastern section of the Arroyo Colorado either forms or closely coincides with the Cameron/Willacy county line. These water bodies, along with the associated Cameron/Willacy County line, were used as boundaries for most natural resource RSAs, with exceptions as noted below. Also except as noted below, western RSA boundaries were set at the Cameron/Hidalgo County line. While this does not represent a natural boundary, it is located approximately 35 miles from the SPI 2nd Access project area, sufficiently far that cumulative effects associated with the project would be expected to be minimal.

Water Quality RSA – Bounded by Arroyo Colorado (TCEQ Stream Segments 2201 and 2202) /Cameron County line, Rio Grande (TCEQ Stream Segments 2301 and 2302), and Gulf of Mexico (TCEQ Stream Segment 2501), inclusive of waters within these segments. The Water Quality RSA is shown in **Exhibit 6-2**.

Freshwater Wetlands RSA – Bounded by Arroyo Colorado/Cameron County line, Rio Grande, and Gulf of Mexico. NWI freshwater wetlands are found throughout the mainland; however, they are most concentrated in the eastern half of the mainland. A few NWI freshwater wetlands also occur on Padre Island. The Freshwater Wetlands RSA is shown in **Exhibit 6-3**.

Estuarine Wetlands RSA – Bounded by Arroyo Colorado/Cameron County line, Rio Grande, and Gulf of Mexico. However, because NWI estuarine wetlands are concentrated near the Laguna Madre and do not occur in the western portion of Cameron County, the western boundary was established (using GIS) from approximately one to five miles (variably) west of the Laguna Madre, near the western extent of NWI estuarine wetland occurrence. This area, along with critical habitat in Willacy County, represents a habitat-based boundary for the Piping Plover. The Estuarine Wetlands RSA is shown in **Exhibit 6-4**.

Threatened and Endangered Species RSA – Because of the dissimilarity of habitats and associated species between the mainland, Padre Island, and the Laguna Madre/Gulf of Mexico, threatened and endangered species were divided accordingly into three RSAs.

a. Mainland - Bounded by Arroyo Colorado/Cameron County line, Rio Grande, and the Laguna Madre. Habitats include thorn-scrub brush, grassland/rangeland, and wetland. A habitat-based subset of this RSA solely comprised of thorn-scrub brush was utilized to assess cumulative impacts to ocelot/jaguarundi, and a subset of this RSA solely comprised of grassland/rangeland was utilized to assess cumulative impacts to and Northern Aplomado Falcon. The RSA is shown in **Exhibit 6-5**.
b. Laguna Madre and Gulf of Mexico – The waters of Laguna Madre and Gulf of Mexico, to the southern and northern extents of the lower Laguna Madre, which extends northward into Willacy County. This represents a habitat-based boundary for green, Kemp's ridley, and loggerhead sea turtles, and for the Brown Pelican. The RSA is shown in **Exhibit 6-6**.
c. Padre Island – Bounded by the Laguna Madre, Gulf of Mexico, and the Cameron/Willacy county line (associated with the Arroyo Colorado, as discussed previously). The RSA is shown in **Exhibit 6-7**.

Rare Vegetation and Seagrass RSA – Bounded by Arroyo Colorado/Cameron County line, Rio Grande, and Gulf of Mexico, but includes the waters of the entire lower Laguna Madre extending north into Willacy County. The Rare Vegetation and Seagrass RSA is shown in **Exhibit 6-8**.

Essential Fish Habitat RSA - The waters of lower Laguna Madre, which extend north into Willacy County. The Rare Vegetation and Seagrass RSA is shown in **Exhibit 6-9**.

Migratory Bird RSA - Bounded by Arroyo Colorado/Cameron County line, Rio Grande, and Gulf of Mexico. The Migratory Bird RSA is shown in **Exhibit 6-10**.

Cumulative impacts analysis relies heavily on geographic information system data; therefore, data from 1990's through the present are important, because this is the time frame for which data amenable to use in a geographic information system is available. The analysis time period extends through 2045 which coincides with the planning horizon presented by *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009), prepared for the Cameron County Regional Mobility Authority (CCRMA), which provides historic, current and projected economic data for the region. This time frame also encompasses the respective Brownsville and Harlingen-San Benito Metropolitan Planning Organization Metropolitan Transportation Plans horizon for transportation planning (2030).

6.2.3 Step 3: Health and Historic Context of Resources

This discussion describes the historical and current condition of each resource within the context of its RSA. The examination of the current health and historical context of each resource is necessary to establish a baseline for determining the impacts of the proposed action and other reasonably foreseeable actions on the resource. For each resource, special concerns identified from the direct and indirect impacts analyses and the resource's present abundance and quality were evaluated. The impacts of historical activities, the resource's response to those activities, and the continuing stresses imposed on the resource and resource resilience to these stresses were considered.

Demographic and land use information was obtained from local government planning offices, meetings with stakeholders and Web sites. Land use changes, vegetation and wildlife habitat were generally characterized through interpretation of 1977, 2007 and 2008 high resolution aerial photography. According to the USFWS, examination of aerial photography may be of limited use for identifying appropriate habitat for endangered species, particularly the ocelot. Specifically, it is difficult, using aerial photography, to differentiate optimal ocelot habitat (>95% canopy cover) from sub-optimal habitat (75%-95% canopy cover). Nevertheless, examination of aerial photography provides a reasonable method of identifying potential ocelot habitat on a large scale. This method was used to identify light brush (25%-75% canopy) and dense brush (>75% canopy). U.S. Fish and Wildlife Service (USFWS) digital NWI maps were utilized for information regarding potential waters of the U.S., including wetlands. Information on the various resources studied was digitized, and spatial data were developed through the use of geographic information systems software. RSA information, including summaries of resource health as well as indicators of resource condition and potential resource impacts, are found in **Table 6-4**.

Table 6-4: Resource Indicators and RSAs for the Cumulative Impacts Analysis

Resource Category	Indicators of Resource Condition and Potential Impacts	RSA	Health of Resource
Socioeconomic	Impacts on Regional Economics	Cameron County (Approximately 816,640 acres)	Poor – Currently, the regional economy of Cameron County is lagging behind the rest of the state and experiences a high unemployment rate as a result of the economic downturn. In recent history, Cameron County experienced a higher job growth rate compared to the rest of the state. However, unemployment rates have been higher than the rest of the state.
Water Resources	Water Quality	Watersheds (within Cameron County): Arroyo Colorado (above tidal and tidal), Rio Grande (Below Falcon Reservoir and tidal), Laguna Madre, Brownsville Ship Channel, South Bay, Gulf of Mexico (Approximately 691,774 acres)	Poor - Nine of the 18 TCEQ-assessed water bodies within the RSA contain segments listed on the 2010 303(d) List of Impaired Waters. Elevated bacteria levels, Polychlorinated biphenyls, mercury and low dissolved oxygen are the primary water quality concerns.
Water Resources	Freshwater wetlands and other waters of the U.S.	Watersheds: Arroyo Colorado (above tidal), Rio Grande (Below Falcon Reservoir), Laguna Madre, Brownsville Ship Channel, South Bay, Gulf of Mexico (within Cameron County) (Approximately 618,297 acres)	Declining - continued changes in land use due to development are expected to convert more wetlands to non-wetlands.
Water Resources	Estuarine wetlands	Watersheds: Arroyo Colorado (tidal), Rio Grande (tidal), Laguna Madre, Brownsville Ship Channel, South Bay, Gulf of Mexico (within Cameron County) (Approximately 243,103 acres)	Declining - continued changes in land use due to development are expected to convert more wetlands to non-wetlands.
Threatened and Endangered Species, State – Listed Rare Species including ocelot, jaguarundi, and Northern Aplomado Falcon	Mainland Threatened and Endangered Species and rare species and their habitats, including thorn-scrub brush, rangeland and aquatic and wetland habitats	Watersheds: Arroyo Colorado (above tidal and tidal), Rio Grande (Below Falcon Reservoir and tidal), Laguna Madre, Brownsville Ship Channel, South Bay, Gulf of Mexico (within Cameron County) (Approximately 497,947 acres)	Declining - continued changes in land use due to development are expected to convert more habitat to non-habitat and increase fragmentation. According to the USFWS, currently protected lands are not enough to sustain the ocelot or jaguarundi in Texas, due to loss of habitat and also to connectivity between habitat patches, a basic requirement for the recovery of these species. Moreover, currently protected lands are not enough to sustain recovery of all mainland threatened and endangered species. Each species has its own particular requirements which may or may not overlap with the requirements of other listed species. Conservation efforts by USFWS, TPWD and private organizations pursue conservation of these habitats in an effort to minimize impacts.

Table 6-4: Resource Indicators and RSAs for the Cumulative Impacts Analysis

Resource Category	Indicators of Resource Condition and Potential Impacts	RSA	Health of Resource
Threatened and Endangered Species, State – Listed Rare Species	Laguna Madre and Gulf Threatened and Endangered Species and rare species and their habitats including open waters of the Laguna Madre and Gulf of Mexico and associated estuarine mud and salt flats	Watersheds: Within Cameron County - Arroyo Colorado (above tidal and tidal), Rio Grande (Below Falcon Reservoir and tidal), Brownsville Ship Channel and South Bay. Within Cameron and Willacy Counties - Laguna Madre and Gulf of Mexico (Approximately 234,777 acres)	Declining - continued changes in land use due to development are expected to convert more habitat to non-habitat. According to the USFWS, currently protected lands are not enough to sustain recovery of all threatened and endangered species of the Laguna Madre and Gulf of Mexico. Each of these species has its own particular requirements which may or may not overlap with the requirements of other listed species. Conservation efforts by USFWS, TPWD and private organizations have continued to conserve habitats and minimize impacts to species.
Threatened and Endangered Species, State – Listed Rare Species	Island Dune and Beach Threatened and Endangered Species and rare species and their habitats including dune, beach, mud and salt flats	Watersheds: Arroyo Colorado (above tidal and tidal), Rio Grande (Below Falcon Reservoir and tidal), Laguna Madre, Brownsville Ship Channel, South Bay, Gulf of Mexico (within Cameron County) (Approximately 25,357 acres)	Declining - continued changes in land use due to development are expected to convert more habitat to non-habitat. According to the USFWS, currently protected lands are not enough to sustain recovery of threatened and endangered species inhabiting South Padre Island. Each of these species has its own particular requirements which may or may not overlap with the requirements of other listed species. Conservation efforts by USFWS, TPWD and private organizations have continued to conserve habitats and minimize impacts to species.
Piping Plover	Island Dune and Beach Threatened and Endangered Species and rare species and their habitats including dune, beach, mud and salt flats	Watersheds: Arroyo Colorado (above tidal and tidal), Rio Grande (Below Falcon Reservoir and tidal), Laguna Madre, Brownsville Ship Channel, South Bay, Gulf of Mexico (within Cameron County) (Approximately 25,357 acres)	Declining - continued changes in land use due to development are expected to convert more habitat to non-habitat. According to the USFWS, currently protected lands are not enough to sustain recovery of threatened and endangered species inhabiting South Padre Island. Each of these species has its own particular requirements which may or may not overlap with the requirements of other listed species. Conservation efforts by USFWS, TPWD and private organizations have continued to conserve habitats and minimize impacts to species.
Rare Vegetation Series and Seagrass	Mainland remnant thorn-scrub brush, rangeland and aquatic and wetland habitats and Laguna Madre seagrass beds	Watersheds: Within Cameron County - Arroyo Colorado (above tidal and tidal), Rio Grande (Below Falcon Reservoir and tidal), Brownsville Ship Channel and South Bay. Within Cameron and Willacy Counties - Laguna Madre and Gulf of Mexico (737,099 acres)	Declining - continued changes in land use due to development are expected to convert more habitat to non-habitat, including development adjacent to the Laguna Madre and associated potential effects to seagrass. According to the USFWS, currently protected lands are not enough to ensure adequate protection for mainland rare vegetation series, or for Laguna Madre seagrass beds. Each rare vegetation series has its own particular requirements which may or may not overlap with the requirements of other series. Conservation efforts by USFWS, TPWD and private organizations have continued to promote conservation of seagrass beds and conservation of native vegetation.
Essential Fish Habitat	Habitat	Lower Laguna Madre in Cameron and Willacy Counties (137,446 acres)	Declining - Conservation efforts by USFWS, TPWD and private organizations has continued to conserve seagrass beds and promote conservation awareness of threats to seagrass.

Table 6-4: Resource Indicators and RSAs for the Cumulative Impacts Analysis

Resource Category	Indicators of Resource Condition and Potential Impacts	RSA	Health of Resource
Migratory Birds and Rookeries	Migratory Birds and their habitats	Watersheds: Arroyo Colorado (above tidal and tidal), Rio Grande (Below Falcon Reservoir and tidal), Laguna Madre, Brownsville Ship Channel, South Bay (within Cameron County) (618, 297 acres)	Stable - While impacts to individuals may occur, population impacts are not anticipated. Conservation efforts by USFWS, TPWD and private organizations have continued to conserve habitats and minimize impacts to species.

Source: HNTB (2009)
Note: Acreages are estimates

6.2.4 Step 4: Identify Direct and Indirect Impacts of Project

The analysis of cumulative impacts must consider the direct and indirect impacts of the proposed action within the RSAs. Identification of the direct and indirect impacts of the proposed action would also assist in determining the project's contribution to the cumulative impact on the resource. The direct and indirect impacts expected from the proposed project were discussed in detail in **Chapters 4** and **5**, respectively. The results of the study of direct and indirect impacts to resources included in this cumulative effects analysis are summarized at the end of this chapter in **Table 6-41**, along with anticipated impacts from past and reasonably foreseeable future projects.

6.2.5 Step 5: Reasonably Foreseeable Actions

CEQ regulations indicate that cumulative impacts analyses must include an assessment of impacts of other past, present and/or reasonably foreseeable future actions affecting the resources studied (40 CFR Section 1508.7). This portion of the cumulative impacts analysis identifies other transportation projects and planned large-scale public or private developments. The identification of other past, present and reasonably foreseeable future actions for the respective RSAs was based on a review of proposed and ongoing development projects, local municipality plans, master plan communities and county economic development studies. Experts on land use planning and development and local planners in the region were surveyed during development of *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009). Past, current and planned transportation projects were determined from the Brownsville and Harlingen-San Benito MTPs, the City of Brownsville's *Imagine Brownsville Comprehensive Plan* report and *Proposed South Padre Island Second Access Project Economic Analysis*, information from the *South Padre Island Comprehensive Plan* (2008) and from the City of Port Isabel *Comprehensive Plan* (2005). In addition to site-specific development plans, the anticipated impacts from the eventual development of the watershed RSA, as reflected in comprehensive land use plans, were considered in reviewing future impacts to resources. From these data sources, it was determined that a maximum cumulative conversion of 32,947 acres of undeveloped land to developed land is possible.

6.2.6 Steps 6, 7 and 8: Assess Cumulative Impacts, Report Results and Discuss Mitigation

Cumulative impacts are evaluated using the following factors: the historical context of each resource, current condition and trend, future land use and zoning plans and the pertinent regulations and standards associated with each resource. These factors capture the influences

that have shaped and are shaping the amount and quality of each resource, and which would continue to shape the resources into the future. Several key assumptions that are implicit in the approach to predicting the future condition of resources include:

- All reasonably foreseeable actions would be completed as currently planned;
- The relationships between the resources, ecosystems and human communities that have been identified from historical experience would continue into the future; and
- The sponsors of government and private projects would abide by relevant federal, state and local laws designed to protect each resource, and regulatory agencies would perform their duties in accordance with legal requirements and internal guidelines.

Of particular importance is the assumption concerning compliance with relevant environmental laws designed to ensure the sustainability of resources. Over the past several decades, federal, state and local lawmaking bodies have enacted statutes, regulations and ordinances designed to preserve and enhance the abundance and quality of natural resources by requiring project sponsors to avoid, minimize and mitigate the environmental impacts of their projects or actions. The cumulative impacts analysis focuses on the net effects on each resource that remain after full compliance with the regulatory requirements at all levels and in light of mitigation that would likely be applied. The discussion of cumulative impacts for each resource studied first outlines key regulatory measures government leaders and agencies have implemented to manage and sustain the resource for long-term use, then evaluates expected net cumulative impacts for each of the resources analyzed. More detailed discussions of specific regulatory measures to control adverse impacts to various resources are contained in discussions of direct impacts to specific resources in **Chapter 4.**

In order to have a cumulative impact on a resource, the proposed action must have either a direct or indirect impact on that resource. Additionally, the cumulative impact analysis focuses on those resources impacted by the proposed action and resources currently in poor or declining health, even if the impacts resulting from the project are relatively small (less than significant). Lastly, resources of importance to stakeholders are considered. All of the resource categories considered in this draft environmental impact statement are candidates for analysis with regard to indirect and cumulative impacts.

Cumulative impacts are analyzed in terms of the specific resource being affected. The resources considered in this environmental analysis are:

- Regional Economics
- Surface Water Quality
- Waters of the U.S - Freshwater Wetlands
- Waters of the U.S - Estuarine Wetlands
- Threatened and Endangered Species and State–Listed Rare Species - Mainland
- Threatened and Endangered Species and State–Listed Rare Species – Laguna Madre and Gulf of Mexico
- Threatened and Endangered Species and State–Listed Rare Species – Island Dune and Beach Habitats
- Rare Vegetation Series and Seagrass
- Essential Fish Habitat
- Migratory Birds

6.3 CUMULATIVE IMPACTS ANALYSIS PER RESOURCE

A discussion and application of the cumulative impacts analysis for each selected resource or resource feature follows.

6.3.1 Regional Economics

6.3.1.1 Step 1: Resource Identification – Regional Economics

The portions of the project area and the RSA considered for this analysis are expected to experience regional economic development as a result of the proposed project. The proposed 2nd Access Project would add approximately 2,583 direct and indirect jobs to the study area by 2045 (TXP, Inc. 2009). In addition, regional economic development is included in the need and purpose for the proposed 2nd Access Project that has been presented to the public at public meetings. Substantial economic benefits to the regional economy of Cameron County as a result of the proposed 2nd Access Project and the inclusion of regional economic development in the need and purpose for the proposed project make analysis necessary.

6.3.1.2 Step 2: RSA – Regional Economics

The RSA defined to determine regional economic issues related to the proposed 2nd Access Project includes the entirety of Cameron County and appears in **Exhibit 6-1**. Outside the bounds of the RSA, it is not anticipated that the proposed 2nd Access Project would influence economic development. The RSA encompasses approximately 1,276 square miles, or approximately 816,640 acres.

6.3.1.3 Step 3: Resource Health and Historical Context – Regional Economics

Current Health of the Resource

The 2007 population estimate for the regional economics RSA (Cameron County) is approximately 387,210 residents, with approximately 123,150 of the residents employed in the county in a diverse economy that includes international commerce, industry, government, education, agriculture, tourism and medicine. Approximately 11,324 of Cameron County residents are employed outside of the county or across the border in Mexico. Cameron County currently experiences lower per capita incomes and higher unemployment rates than the rest of the state. Income data from the U.S. Department of Commerce (2006) indicates an annual per capita income of $18,559 in Cameron County. This compares to $35,166 in Texas. Employment Data from the Texas Workforce Commission (July 2009) indicates that 10.7 percent of the population are unemployed in Cameron County. This compares to 8.2 percent in Texas as a whole. This indicates that the current regional economy of Cameron County is lagging behind the rest of the state. In addition, the high unemployment rate in Cameron County is a result of the current economic downturn.

The real gross domestic product (GDP) for the United States decreased by 6.4 percent in the first quarter of 2009, decreased by 0.7 percent in the second quarter of 2009, and increased by 3.5 percent in the third quarter of 2009. The third quarter increase is the greatest in two years.

The shrimping industry, once an important cluster of Port Isabel's economic base, is approaching extinction. Cheaper imports and high gas prices limit the long-term viability of this industry. It is unlikely these jobs will return. As a result, some firms are modifying their business model. For example, a local shrimp processing plant diversified into other food processing activities.

Potentially offsetting the loss of the shrimping industry within the RSA, the Port of Port Isabel has become an attractive location for oil and natural gas exploration and services firms. Proximity to the Gulf of Mexico combined with new offshore exploration has resulted in the majority of land in and around the port being leased. Subsea 7 Inc. is investing an estimated $32 million at the Port of Port Isabel to create a new pipe fabrication spoolbase. In addition, the Port of Brownsville is already home to Keppel AmFELS, a global leader in offshore platform manufacturing that employs 3,000 workers. Growth in the sector should resume once the price of oil and natural gas stabilize (TXP, Inc. 2009).

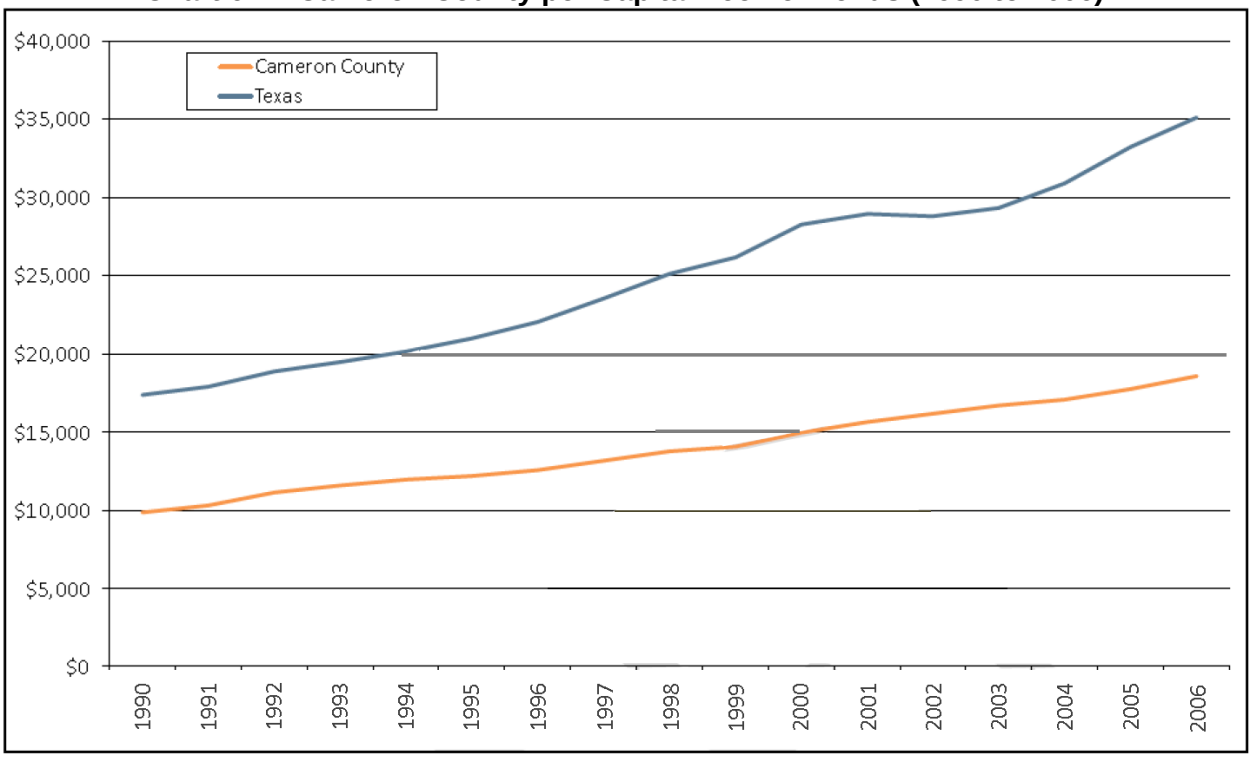
Historical Context of the Resource

Cameron County has been experiencing population and employment growth that exceeds the State of Texas averages since 1990. Data from the U.S. Census Bureau (USCB) indicates that the population of the county increased from 260,120 in 1990 to 336,562 in 2000, a 29.4 percent increase. By 2008, the population had further increased to 392,736, a 16.7 percent increase from 2000 and a 51.0 percent increase from 1990. The 1990–2008 increase compares to a 40.7 percent increase for Texas over the same period.

Data from the *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009) indicates Cameron County also experienced a higher job growth rate than the rest of Texas between 2000 and 2008, with a 14.0 percent growth rate compared to a 9.8 percent growth rate in Texas. Total jobs within Cameron County increased from 109,056 to 124,281 from 2000 to 2008, an addition of 15,225 jobs. Since 2000, population growth (15.1 percent) outpaced employment growth (13.6 percent) and Cameron County economic development officials are challenged with attracting, growing and retaining enough jobs for county residents.

Since Cameron County‘s population and employment growth rates over the past seven years exceeded the State of Texas averages, it would be logical to assume its per capita income would outpace the state as well, but this is not the case. A number of factors help explain these apparently contradictory trends. Factors include a high population growth rate exerting downward pressure on per capita income figures in conjunction with large tourism and retail trade sectors which typically do not pay high wages and an economy that is strongly linked to economic trends in northern Mexico. Data from the U.S. Department of Commerce indicate the county’s per capita income was approximately 59.5 percent of the state average in 1993, 55.6 percent of the state average in 2000 and 52.8 percent of the state average in 2006 (**Chart 6-1**). This indicates a 2.8 percent relative decline in Cameron County’s per capita income when compared with Texas. However, the absolute per capita income in Cameron County increased from 2000 to 2006.

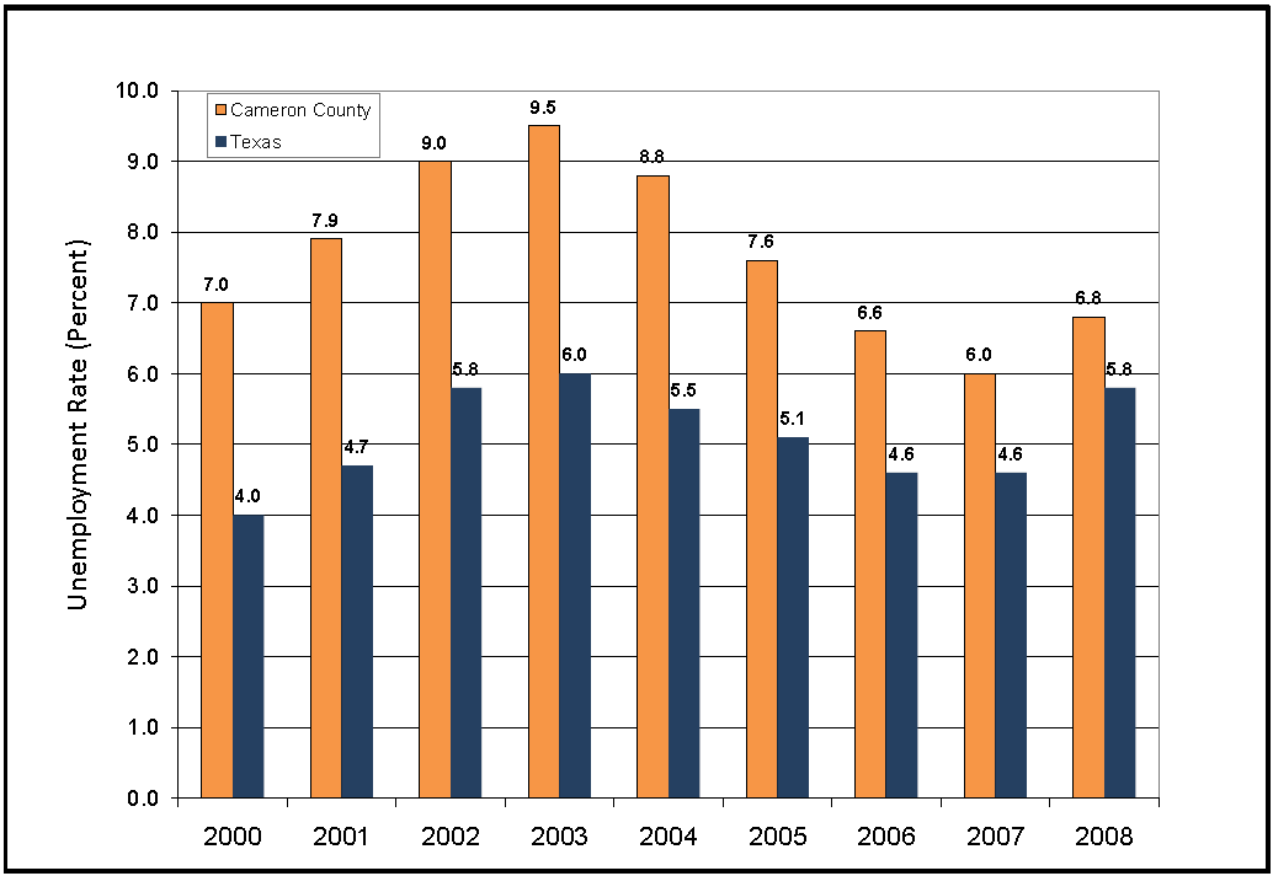
Chart 6-1: Cameron County per Capita Income Trends (1990 to 2006)



Source: TXP, Inc. 2009

In addition to the relative decline in per capita income in recent years, when comparing Cameron County with Texas, Cameron County also experienced higher unemployment rates than the remainder of the state between 1990 and 2008. The largest difference between the Cameron County and Texas unemployment rates was in 2003 when the Cameron County rate was 9.5 percent and the Texas rate was 6.0 percent; a 3.5 percent difference. Cameron County unemployment rates have been improving in comparison to the rest of the state since 2003, with a 3.3, 2.5, 2.0, 1.4 and 1.0 difference in 2004, 2005, 2006, 2007 and 2008, respectively. **Chart 6-2** compares the annual unemployment rates for Cameron County and Texas.

Chart 6-2: Cameron County and Texas Unemployment Rate Comparison



Source: Texas Workforce Commission (2009)

These per capita income and unemployment trends for Cameron County and Texas indicate that in recent history the regional economy of Cameron County was lagging behind the rest of Texas.

6.3.1.4 Step 4: Direct and Indirect Impacts – Regional Economics

As detailed in **Chapters 5.0** and **6.0**, the indirect effects component of cumulative impacts analysis for natural resources focuses on the effects of project-induced development on those resources. In contrast, cumulative impacts analysis for regional economics focuses on project-related job creation. As a result, job creation is the parameter used to measure the direct and indirect impacts of the proposed 2nd Access Project on the regional economy.

Because the mainland and island landings for all 11 reasonable alternatives are in close proximity, there is not a substantial difference with respect to the regional employment impacts; therefore, the direct and indirect impacts on the regional economy for all 11 reasonable alternatives are expected to be the same. The proposed 2nd Access Project is expected to add an estimated 935 direct and indirect jobs to the RSA by 2030 and an estimated total of 2,583 direct and indirect jobs to the RSA by 2045 (TXP, Inc. 2009).

Landowners might alter the specific development pattern or plans for their tracts depending on which of the 11 reasonable alternatives get selected. This in turn might affect the tax revenue implications of the area surrounding the access point landing for each alternative. For example, Alternatives 1, 4, and 8 of the proposed 2nd Access Project, which share a common alignment

on the mainland, would impact an existing shrimp farm and could result in the loss of direct and indirect jobs in the shrimp farming industry within the RSA.

The No-Build Alternative would not create any jobs within the RSA.

6.3.1.5 Step 5: Reasonably Foreseeable Actions – Regional Economics

The *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009) was utilized to determine reasonably foreseeable regional economic growth that is anticipated to occur in the RSA. The report includes forecasts for population, employment and tax revenue. The forecast required a review of macroeconomic trends such as inflation, trade deficits and credit market liquidity that ultimately have an impact on local economic activity, and the implications of the ongoing national economic recession on Cameron County. In addition, a considerable amount of time was spent interviewing stakeholders in Cameron County, and northern Mexico (States of Nuevo Leon and Tamaulipas) and regional studies related to land planning, economic development and tourism were reviewed.

As part of the process, existing and planned activity in Hidalgo County, and the states of Tamaulipas and Nuevo Leon in Mexico were factored into the forecasts. Since Mexican citizens own property on South Padre Island and visit Cameron County as tourists, the Cameron County economy is influenced by economic growth and decline south of the border. Potential transportation projects in Mexico and the Rio Grande Valley might enhance the ability of tourists to reach South Padre Island or shift tourist activity to other locations.

Employment Forecasts

Approximately 126,638 jobs currently (2009) exist within the RSA. Approximately 188,940 jobs are projected for 2030, and 223,108 jobs are projected for 2040, resulting in 96,470 jobs that are expected to be added to the RSA in the reasonably foreseeable future (**Table 6-5**).

Table 6-5: Current and Reasonably Foreseeable Employment in the Regional Economics RSA (2009 to 2040)

Year	Number of Jobs
2009	126,638
2010	128,805
2011	131,525
2012	134,277
2013	137,060
2014	139,874
2015	142,720
2016	145,596
2017	148,502
2018	151,439
2019	154,406
2020	157,402
2021	160,428
2022	163,483
2023	166,567
2024	169,680
2025	172,821
2026	175,990
2027	179,187
2028	182,411
2029	185,662
2030	188,940
2031	192,244
2032	195,574
2033	198,930
2034	202,311
2035	205,717
2036	209,148
2037	212,603
2038	216,081
2039	219,583
2040	223,108

Source: TXP, In. 2009

Construction of other CCRMA Plan roadways is expected to add an additional approximately 2,562 direct and indirect jobs to the RSA by 2030, and another 2,554 direct and indirect jobs to the RSA between 2030 and 2045 (TXP, Inc. 2009). It should be noted these jobs projections only account for the effect of other CCRMA Plan roadways (**Chapter 5**). Additional jobs could be added in the RSA as a result of build-out of Brownsville and Harlingen-San Benito Metropolitan Planning Organization and TxDOT Surface Transportation Improvement Plan Project roadways (**Table 6-9, Section 6.3.2.5**).

6.3.1.6 Step 6: Cumulative Impacts Assessment – Regional Economics

Cumulative impacts are those which result from the incremental impact of a project when added to all other past, present or reasonably foreseeable future actions. Jobs expected to be created

from the proposed 2nd Access Project is the parameter used to measure the cumulative impacts on the regional economy. The *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009) was utilized to determine the cumulative impacts as a result of the proposed 2nd Access Project. The report includes data on past, present and reasonably foreseeable actions for employment in the regional economics RSA. In addition, the report includes the direct and indirect jobs that are expected to be created as a result of the proposed 2nd Access Project. These data were utilized to identify the current and reasonably foreseeable actions in the cumulative impact assessment. For this cumulative impacts assessment, past actions include all actions before 2009, current actions include actions in 2009, and all reasonably foreseeable actions include actions from 2009 to 2045.

Table 6-6 shows the potential cumulative impacts on employment within the regional economics RSA. As mentioned in Step 4, the mainland and island landings for all 11 reasonable alternatives are in close proximity, and there is not a substantial difference when it comes to the regional employment impact. Therefore, the cumulative impacts on the regional economy for all 11 reasonable alternatives are expected to be the same. Currently (2009), there are approximately 126,638 jobs that have been created by all past actions within the regional economics RSA. The proposed 2nd Access Project would create approximately 2,583 direct and indirect jobs in the reasonably foreseeable future (2045), other future actions not associated with other CCRMA Plan projects would create approximately 96,470 jobs (2040), and other CCRMA Plan projects would create approximately 2,554 jobs (2045). Adding up the jobs of all past, present, or reasonably foreseeable future actions, the cumulative impact with the proposed 2nd Access Project on the regional economy would be a minimum of approximately 225,662 jobs (2045).

Table 6-6: Potential Cumulative Impacts on Employment within the Regional Economics RSA

Type of Action	Past Actions	Current and Reasonably Foreseeable Actions	Cumulative Effect
Number of Jobs	There are currently approximately 126,638 jobs within the RSA. Between 2000 and 2008, approximately 14,097 jobs were added to the RSA.	The proposed project would create approximately 2,583 direct and indirect jobs in the reasonably foreseeable future (2045). Other future actions, not including other CCRMA Plan projects, would create approximately 93,916 jobs (2040). Other CCRMA Plan projects would create approximately 2,554 jobs (2045).	The cumulative effect of the past, present, and reasonably foreseeable actions account for approximately 113,150 jobs in the reasonably foreseeable future (2045). This includes 14,097 jobs created between 2000 and 2008, 2,583 from the proposed project and indirect actions, 2,554 from other CCRMA Plan projects, and 93,916 from other future actions.

Source: TXP, Inc. 2009

6.3.1.7 Step 7: Results – Regional Economics

The RSA defined to determine the cumulative effects of the proposed 2nd Access Project includes the entirety of Cameron County. The cumulative impacts analysis was based on the *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009) that was prepared for this draft environmental impact statement. Cameron County has been experiencing rapid population and employment growth that exceeded the State of Texas

averages since 2000. However, population growth outpaced employment growth, and Cameron County economic development officials are challenged with attracting, growing and retaining enough jobs for county residents. In addition, per capita incomes in Cameron County have been declining when compared to the rest of the state and the county experienced higher unemployment rates when compared to the rest of the state. These per capita income and unemployment trends indicate that, in recent history, the regional economy of Cameron County is lagging behind the rest of Texas. Currently, the regional economy of Cameron County is still lagging behind the rest of Texas with a per capita income that is 53.0 percent of the rest of the state and an unemployment rate of 10.7 percent, which is 2.5 percent higher than the rest of the state. The high unemployment rate in Cameron County is a result of the current economic downturn.

The proposed 2nd Access Project is expected to provide substantial regional economic benefits to Cameron County to meet the need and purpose of the project. Jobs expected to be created from the proposed 2nd Access Project is the parameter used to measure the cumulative impacts on the regional economy. The proposed 2nd Access Project is expected to create approximately 2,583 direct and indirect jobs in the reasonably foreseeable future (2045), while all other future actions would create approximately 93,916 jobs (2040). Adding up the jobs of all past, present and reasonably foreseeable future actions, the cumulative impact with the 2nd Access Project on the regional economy is a minimum of approximately 113,150 jobs (2045), with the 2nd Access Project accounting for approximately 2.3 percent of jobs created.

The results of the cumulative impact analysis for the proposed 2nd Access Project indicates that the proposed project will result in regional economic benefits and would have a positive cumulative impact on the regional economy.

3.6.1.8 Step 8: Mitigation – Regional Economics

No mitigation is required, since the proposed 2nd Access Project would have a positive cumulative impact on the regional economy of Cameron County.

6.3.2 Surface Water Quality

6.3.2.1 Step 1: Resource Identification – Surface Water Quality

The resource includes surface waters associated with TCEQ-designated stream segment watersheds, in the Nueces-Rio Grande Coastal river basin within Cameron County. Four segments are streams, the Arroyo Colorado (tidal and above tidal) and the Rio Grande (tidal and below Falcon reservoir). Associated surface water features include numerous unnamed tributaries and irrigation canals, freshwater and estuarine wetlands and resacas, or ancient oxbow lakes of the Rio Grande and its tributaries. Other TCEQ-designated segments include the lower Laguna Madre, the Gulf of Mexico, South Bay, Port Isabel Fishing Harbor watershed and the Brownsville ship channel. Most surface waters in the RSA flow eastward into the Laguna Madre except for the Rio Grande which empties directly into the Gulf of Mexico south of the Laguna Madre. The Brownsville Ship Channel and South Bay outlets converge at the southern tip of the Laguna Madre where it opens into the Gulf. Declining health trends in surface water quality nationally, poor health of regional water quality, and resulting affects to special aquatic sites, such as the Laguna Madre, make analysis necessary.

6.3.2.2 Step 2: RSA – Surface Water Quality

The RSA for surface water quality is shown in **Exhibit 6-2**. Arroyo Colorado Above Tidal (Segment ID: 2202) forms the western half of the northern RSA boundary. Arroyo Colorado

Tidal (Segment ID: 2201) forms most of the eastern portion of the northern RSA boundary, the Laguna Madre comprising the remainder of the northern RSA boundary. Rio Grande Below Falcon Reservoir (Segment ID: 2302) forms the western half of the southern RSA boundary. Rio Grande Tidal (Segment ID: 2301) forms the eastern half of the southern RSA boundary. The Laguna Madre (Segment ID: 2491) and The Gulf of Mexico (Segment ID: 2501) form the eastern boundary of the RSA. The surface water quality RSA comprises approximately 691,774 acres.

6.3.2.3 Step 3: Resource Health and Historical Context – Surface Water Quality

According to the 2010 Texas 303(d) list, nine of the 18 TCEQ-assessed water bodies within the RSA are listed as impaired. Impaired waters are designated Category 5, or waters which do not meet applicable water quality standards or are threatened for one or more designated uses by one or more pollutants. Category 5a waters are those for which a total maximum daily load study is underway, scheduled, or will be scheduled. Category 5b waters are those for which a review of the water quality standards will be conducted before a total maximum daily load is scheduled. Category 5c waters are those for which additional data and information will be collected before a total maximum daily load study is scheduled.

Arroyo Colorado Tidal (Segment ID: 2201) is listed along various portions of its length as impaired due to elevated bacteria levels (Category 5c, Subsegments 03, 04 and 05), elevated levels of dichlorodiphenyl-dichloroethylene in edible tissue (Category 5a, Subsegment 05), low dissolved oxygen (Category 5a, Subsegments 04 and 05), elevated levels of mercury in edible (fish) tissue (Category 5c, Subsegment 05) and elevated levels of polychlorinated biphenyls in edible (fish) tissue (Category 5a, Subsegment 05). Unnamed Drainage Ditch Tributary (B) in Cameron County Drainage District #3 (Segment ID: 2201B) is listed as impaired (Category 5c) along its entire length due to elevated bacteria levels. Arroyo Colorado Above Tidal (Segment ID: 2202) is listed along various portions of its length as impaired because of elevated bacteria levels (Category 5b, Subsegments 01, 02 and 03), elevated levels of mercury in edible (fish) tissue (Category 5c, Subsegments 01, 02 and 03) and elevated levels of polychlorinated biphenyls in edible (fish) tissue (Category 5a, Subsegments 01, 02 and 03). Unnamed Drainage Ditch Tributary (B) to S. Arroyo Colorado (Segment ID: 2202B) is listed as impaired (Category 5c) along its entire length due to elevated bacteria levels. Rio Grande Below Falcon Reservoir (Segment ID: 2302) is listed, along some sections, as impaired due to elevated bacteria levels (Category 5c, Subsegment 01). The Laguna Madre (Segment ID: 2491) is listed as impaired, adjacent to the confluence of the Arroyo Colorado in the northeastern portion of the RSA, due to low dissolved oxygen (Category 5b) and elevated bacteria levels (Category 5c) in waters with oyster beds. The Gulf of Mexico (Segment ID: 2501) is listed as impaired along the entire eastern edge of the RSA due to elevated levels of mercury in edible (fish) tissue (Category 5c). The Brownsville Ship Channel (Segment ID: 2494) from the Laguna Madre to the Port of Brownsville, and the Port Isabel Fish Harbor (Segment ID: 2494A) from the Laguna Madre confluence to 0.25 mile south of SH 100 are both listed as impaired (Category 5c) due to elevated bacteria levels.

Five of these nine water bodies (Arroyo Colorado Above Tidal; Arroyo Colorado Tidal; Rio Grande Below Falcon Reservoir; Rio Grande Tidal; Gulf of Mexico) were listed as impaired on the 2000 Texas 303(d) list and five of these nine classified water bodies (Arroyo Colorado Above Tidal; Arroyo Colorado Tidal; Rio Grande Below Falcon Reservoir; Laguna Madre; Gulf of Mexico) were listed as impaired on the 2008 Texas 303(d) list. While some segments have varied between impaired and not impaired during this period (Laguna Madre; Rio Grande Tidal), the overall trend is toward increasing impairment of surface waters.

Surface water quality is linked to local land use practices, including agricultural, development and urban activity. Non-point source pollution is the leading cause of water pollution in the United States, and is derived from many diffuse sources in the environment picked up by storm water. Sources generally include fertilizers, herbicides, pesticides, toxic chemicals, bacteria from faulty septic systems and naturally occurring animal wastes. Associated water quality concerns include elevated bacteria levels, nutrient enrichment, increased biological oxygen demand leading to low dissolved oxygen levels, and elevated chlorophyll levels associated with algal blooms (Nueces River Authority and TCEQ 2005).

The Arroyo Colorado flows through Cameron County into the Laguna Madre. Flow in the Arroyo Colorado is sustained by wastewater discharges, agricultural irrigation return flows, urban runoff and base flows from shallow groundwater. As a result, there are bacteria, dissolved oxygen and nutrient concerns (TCEQ and TSSWCB 2008).

The Lower Laguna Madre receives significant quantities of agricultural pesticides and other environmental contaminants from the Arroyo Colorado, which carries irrigation drainage from Cameron County farming areas. Commercial activity on the Laguna Madre, such as oil barge transport, as well as effluent inflows from commercial shrimp farms, also contributes to water quality concerns in the Laguna Madre (TPWD 2009).

Based on examination of 1977 aerial photography, an estimated 26,051.8 acres (3.8 percent) of the RSA was developed at that time, compared to the approximately 70,226.0 acres (10.2 percent) developed in 2008. Additionally, a total of 651 of the RSA's 1,709 subdivisions (**Table 6-8)**, totaling approximately 25,316.1 acres (3.7 percent), are currently under development. Therefore, since 1977 there has been approximately 69,490.3 acres of development, which is an increase of 266.7 percent within the surface water quality RSA. Currently, approximately 13.8 percent of the surface water quality RSA is developed.

Additionally, due to population increases and low income levels, Cameron County, like many counties in the border area, has witnessed the development of settlements known as colonias, distinguished from standard housing in that they lack one or more forms of infrastructure, for example wastewater or trash disposal service. As a result, colonias are often a source of non-point source pollution. In Cameron County, a significant non-point pollution source has been attributed to runoff from the Green Valley Farms colonia and surrounding agricultural areas. Contaminated runoff flows into a man-made ditch that drains into the Arroyo Colorado tidal segment and eventually into the Laguna Madre. During large flood events, a portion of this water diverts to the Resaca De Los Fresnos which flows into the Laguna Atascosa and through the Laguna Atascosa National Wildlife Refuge (LANWR) (Nueces River Authority and TCEQ 2005).

Use of fertilizer and pesticides in residential landscaping has also been identified as a threat to surface water quality in the Lower Rio Grande Valley. There are local water bodies where levels of landscape-related pollutants exceed water quality standards and require total maximum daily load studies (TCEQ and TSSWCB 2008).

Because the TxDOT guidance on cumulative impacts analysis requires the NEPA practitioner to evaluate resources that are in poor or declining health or at risk (even if project impacts are minor), cumulative impacts to surface water quality will be evaluated further.

6.3.2.4 Step 4: Direct and Indirect Impacts – Surface Water Quality

Direct effects from the project include approximately 287.0 to 466.9 acres, depending on the build alternative and acreage affected by underground utility relocation outside the proposed 2nd Access ROW, if required. Rainfall runoff rates would increase due to an increase in impervious cover. **Table 6-7** shows impervious cover that would be added to the RSA by build alternative.

Table 6-7: Impervious Cover By Alternative*

Alternative	Impervious Cover (acres)
1	36.7
2	29.7
3	14.3
4	32.3
5	25.3
6	9.9
7	28.1
8	12.7
9	34.9
10	25.9
11	10.5

Source: HNTB (2009)

While permanent water quality best management practices are planned for the mainland and island sections of the project roadway (**Chapter 7**), no permanent best management practices are yet proposed for the Laguna Madre crossing component of the project. This would result in an increase in impervious cover and greater volumes of runoff with roadway pollutants affecting the Laguna Madre during storm events. Accidental spills on the causeway could result in contaminants introduced to the Laguna Madre.

According to *Proposed South Padre Island Second Access Project Economic Analysis*, an estimated 402.1 acres of induced development (239.8 acres on South Padre Island and 162.3 acres on the mainland) could occur by 2045 as a result of the proposed 2nd Access Project above the No-Build Alternative (TXP, Inc. 2009), with associated increases in impervious cover. New residential development would also result in new municipal discharges from sewage treatment facilities and storm water runoff from new off-system roadways. Substantial impacts from induced development runoff and these new roadways, however, would not be anticipated due to implementation of construction and permanent best management practices in conjunction with development.

Threats to water quality from contaminated runoff from impervious cover associated with induced development would be minimized by engineered water quality controls; therefore, water quality indirect effects from induced development would not be anticipated to be substantial. The TCEQ requires temporary and permanent best management practices designed to assure that unacceptable impacts to water quality are avoided. These measures include, but are not limited to, silt fences, check dams, vegetative swales and filter strips and detention basins. The project would also include features to facilitate the control of possible spills of hazardous materials along the roadway.

6.3.2.5 Step 5: Reasonably Foreseeable Actions – Surface Water Quality

A total of 1,709 subdivisions totaling approximately 46,582.7 acres have been subdivided, with an average lot size of approximately 0.57 acres. Of these developments, 173 subdivisions,

totaling approximately 5,139.8 are planned for future development (all parcels and platted lots vacant). Subdivision information for the RSA is listed in **Table 6-8**.

Table 6-8: Subdivisions in the Surface Water RSA

Subdivision Name	No. of Lots	Acreage
SANTA ISABEL GRANT	9	6271.5
EL JARDIN RESUBDIVISION	319	2873.2
ESPIRITU SANTO IRRGTD LAND C0 SUBD	188	1650.8
BARREDA GARDENS SUBDIVISION	181	1610.3
SAN BENITO LAND & WATER CO SUBD	294	1463.4
MONTE GRANDE SUBDIVISION 1	59	1380.4
BAY VIEW PARK ADDITION	194	1306.7
W F HULL SUBDIVISION	47	872.6
DELTA FARMS SUBDIVISION	30	844.4
EL JARDIN SUBDIVISION SHARE 19/27	82	753.5
LAGUNA VISTA CLUB/TOWNESITE	22	750.2
SANTA ISABEL GRANT PORT ISABEL	81	687.7
ESPIRITU SANTO GRANT SHARE 22	82	679.0
EL JARDIN SUBDIVISION SHARE 19/27	423	674.0
BROWNSVILLE LAND & IMP CO SUBD	344	629.3
SAN BENITO LAND & WATER CO SUBD	51	620.4
ESPIRITU SANTO GRANT SHARE 19	89	448.4
AMIGOLAND SUBD SEC II UNIT C	24	423.9
J C BENNETT SUBDIVISION	12	391.0
EL JARDIN SUBDIVISION SHARE 19	389	384.9
R A LIECK SUBDIVISION	21	370.3
PADRE BEACH SUBDIVISION	1938	342.6
BROWNSVILLE ORIGINAL TOWNSITE	1879	314.3
LON C HILL SUBDIVISION	64	305.1
PADRE ISABEL ESTATES SUBDIVISION	2170	259.9
BAYVIEW CITRUS GROVES U-3 SEC-8	64	257.6
CHICAGO GARDENS SUBDIVISION	121	232.4
LOS FRESNOS ORIGINAL TOWNSITE	915	195.3
ROSE RESUB	40	188.8
RESACA FRONT SUBDIVISION	34	182.0
PORT ISABEL ORIGINAL TOWNSITE	919	178.8
LOS EBANOS PROPERTIES SUBDIVISION	148	176.4
BAYVIEW CITRUS GROVES U-4 SEC-2	18	171.9
LAGUNA VISTA ORIGINAL TOWNSITE	412	169.8
EAST BROWNSVILLE ADDITION	1026	157.7
MEDIA LUNA ADDITION	76	153.7
WEST BROWNSVILLE ADDITION	646	149.4
PADRE ISLAND UNSUBDIVIDED ABST 260	14	145.6
EMILIA SUBDIVISION	41	143.7
MAGIC VALLEY RESUBDIVISION	14	141.3
FRESNOS LAND & IRRG CO SUBDIVISION	9	138.7
BROWNELL SUBDIVISION	49	133.9
RIO HONDO ORIGINAL TOWNSITE	411	130.0

Subdivision Name	No. of Lots	Acreage
LAS LAGUNAS SUBDIVISION	17	123.8
LAND O'LAKE SUBDIVISION BLKS 1-11	216	122.8
J S DUNCAN SUBDIVISION	14	122.8
ESPIRITU SANTO GRANT SHARE 12	0	121.5
EL JARDIN SUBDIVISION SHARE 19	59	121.1
OLMITO GARDENS SUBD TRACT 1	39	120.2
CUNNINGHAM'S SUBD SAN BENITO	17	116.9
BAYVIEW CITRUS GROVES U-3 SEC-5	6	115.2
RANCHO VIEJO SUBD SECTION X	47	114.2
JARDIN TERRACE SUBDIVISION	47	112.9
RANCHO VIEJO ESPIRITU SANTO SHRE 1	13	112.1
BAYVIEW CITRUS GROVES U-4 SEC-3	6	108.5
GARDEN PARK SUBDIVISION	483	106.9
BROWNSVILLE LAND AND IMPROVEMENT	4	104.0
ACACIA LAKE TRACT SUBDIVISION	29	102.3
BROWNSVILLE CNTRY CLUB SUBD	0	101.8
CHAMPION SUBDIVISION	16	101.1
HIGHWAY SUBDIVISION	14	99.4
CLARA BENNETT SUBDIVISION	12	98.6
STILLMAN EXTENTION BROWNSVILLE	447	93.0
SAN BENITO THIRD ADDITION	353	91.8
PALO ALTO SUBDIVISION	7	90.1
BAYVIEW CITRUS GROVES U-3 SEC-7	29	89.0
LA POSADA SOUTH SUBD SEC III	597	88.3
EL JARDIN SUBDIVISION SHARE 32	3	86.9
RIO VIEJO SUBDIVISION	163	85.3
VILLA DEL NORTE SUBDIVISION	149	80.9
BISHOP-RICE-TAYLOR SUBDIVISION	41	79.7
THE ACADEMY SUBDIVISION PHASE I	5	78.7
BROWNSVILLE CNTRY CLUB SUBD SEC 3	259	76.7
SAN ROMAN TOWNSITE	7	76.7
COUNTRY CLUB ESTATES AT VICC	263	76.3
HARRIS GENTRY SUBDIVISION SEC-3	4	75.7
LAND O'LAKE SUBD BLKS C & H	186	75.0
ABELARDO ESTATES SUBDIVISION	28	74.7
TREASURE HILLS SUBDIVISION 5	107	74.6
PAREDES TRACT ADDITION	543	73.3
MOOSE LAKE VILLAGE SUBDIVISION	83	73.2
BAYVIEW CITRUS GROVES U-3 SEC-6	22	73.0
RESACA ESCONDIDA SUBDIVISION	36	72.8
LOZANO BANCO 122	0	72.8
SAN BENITO ORIGINAL TOWNSITE	349	70.9
EBONY HEIGHTS SUBDIVISION	452	68.5
CHICAGO GARDENS SUBDIVISION	94	67.9
SAN BENITO BUSINESS PARK SUBD I	14	67.8
HARBOR HEIGHTS SUBDIVISION 1	236	67.8
BAYVIEW CITRUS GROVES U-3 SEC-4	22	67.5

Subdivision Name	No. of Lots	Acreage
FRESNOS LAND AND IRRIGATION CO. SUBD	12	67.3
ACACIA LAKE GARDENS SUBDIVISION	177	66.4
GREEN VALLEY ESTATES SUBDIVISION	88	66.1
LOS EBANOS SUBDIVISION	199	63.7
COLONIA VICTORIA SUBDIVISION	519	63.2
COLONIA ACACIA SUBDIVISION	464	63.1
FIESTA ISLES SUBDIVISION	304	63.1
ARROYO ESTATES SUBDIVISION	139	62.5
FRESNOS LAND AND IRRIGATION CO. SUBD	12	61.6
BAYVIEW CITRUS GROVES U-4 SEC-4	11	59.8
BAYVIEW CITRUS GROVES U-4 SEC-5	2	59.7
GARCIA BAYFRONT SUBDIVISION	13	58.7
FRENCH RIVER VALLEY SECTION I	240	58.2
PADRE BEACH ESTATES SUBDIVISION	52	57.8
BROWNELL TRACT ADDITION	70	57.3
TREVINO-CANALES BANCO NO 5	3	56.7
RANCHO VIEJO SUBD SECTION II	89	54.2
PASTO VERDE SUBDIVISION	206	53.9
RANCHO VIEJO SUBD SECTION XI	129	53.7
BROWNSVILLE CNTRY CLUB SUBD SEC 6	321	52.8
BOULEVARD HEIGHTS ADDITION	331	51.9
BAYVIEW CITRUS GROVES U-4 SEC-10	7	50.8
SUBDIVISIONS > 50 ACRES (112)	22,875	34,952
ALL SUBDIVISIONS < 50 ACRES (1,597)	35,726	11,630.7
TOTAL SUBDIVISIONS (1,709)	**58,601**	**46,582.7**

Source: Cameron County Appraisal District (2009)

According to *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009), an additional 397.0 acres of induced development beyond that induced by the proposed 2nd Access Project could occur by 2045 as a result of full build-out of the other CCRMA roadway projects. It should be noted this projection only accounts for the effect of CCRMA Plan roadways. Additional induced development in the RSA could result from full build-out of Brownsville and Harlingen-San Benito Metropolitan Planning Organization and TxDOT Surface Transportation Improvement Plan Project roadways, as listed in **Table 6-9**. The transportation projects proposed in the respective Brownsville and Harlingen MTPs would increase the impervious cover in the RSA and could also add to other impacts on surface waters within the RSA.

Table 6-9: Brownsville and Harlingen-San Benito Metropolitan Planning Organizations and TxDOT Surface Transportation Improvement Plan Projects with Associated Waterbody Crossings and Impairment Status

Roadway Project	Additional ROW (acres)	Additional Impervious Cover (acres)	Waterbodies Crossed	Impairment Status/ Crossing Location in Relation to Impaired Streams
US 77/83 Expressway (Future Interstate)	33.6	55.6	Arroyo Colorado Above Tidal	Crosses segment impaired for bacteria and mercury
			Resacas de los Cuates	Crossing over 20 miles upstream of Arroyo Colorado Tidal and Laguna Madre
			Resaca del Rancho Viejo	Crossing over 20 miles upstream of Arroyo Colorado Tidal and Laguna Madre
			Resaca de la Palma	Crossing over 10 miles upstream of Rio Grande Below Falcon Reservoir
			Resaca de los Fresnos	Crossing approximately 9 miles upstream of nearest outfall to Arroyo Colorado Above Tidal/Arroyo Colorado Tidal Boundary
FM 511 (Future Interstate-North Loop)	606.5	100.2	N/A	
FM 511 (East Loop)	67.2	13.4	N/A	
US 281 Connector to SH 100	606.1	164.9	N/A	
US 281	121.8	20.4	N/A	
US 281 Overpasses	92.7	17.8	N/A	
FM 1732	0.0	Unknown	Resaca del Rancho Viejo	
SH 48	27.5	53.0	Resaca de la Palma	Crossing over 6 miles upstream of nearest outfall to Rio Grande Below Falcon Reservoir
			Resaca del Viejo	Crossing over 15 miles upstream of nearest outfall to Laguna Madre
			San Martin Lake	Crossing approximately 5 miles upstream of nearest outfall to Laguna Madre
			Bahia Grande	Crossing approximately 3 miles upstream of nearest outfall to Laguna Madre
SH 100	30.4	0.0	Laguna Madre	Located on west shore of Laguna Madre
Port Lead Blvd	39.8	33.8	N/A	
SH 4	15.0	15.1	Resaca de la Palma	Crossing approximately 4 miles upstream of nearest outfall to Rio Grande Below Falcon Reservoir
FM 511	14.6	5.8	N/A	
FM 802	10.5	7.7	N/A	
FM1419	41.4	5.6	N/A	
FM 3068 (East Loop)	7.3	4.4	N/A	
FM 1847 and Paredes Line Road	0.0	18.0	Resacas de los Cuates	Crossing over 15 miles upstream of Laguna Madre

Roadway Project	Additional ROW (acres)	Additional Impervious Cover (acres)	Waterbodies Crossed	Impairment Status/ Crossing Location in Relation to Impaired Streams
FM 3248	20.3	25.7	Rio Grande Resaca de la Palma	Crossing over 15 miles upstream of Laguna Madre
			Resaca del Rancho Viejo	Crossing over 10 miles upstream of Laguna Madre
East Loop	58.2	33.0	N/A	
West Loop	81.2	55.2	N/A	
Pineda Boulevard	52.1	35.4	N/A	
Morrison Road	79.6	64.2	Resaca del Ranch Viejo	Crossing over 10 miles upstream of Laguna Madre
Coffee Port	12.0	13.4	N/A	
Old Port Isabel Road	13.5	7.7	Resaca de la Palma	Crossing approximately 8 miles upstream of nearest outfall to Rio Grande Below Falcon Reservoir
FM 803	7.3	4.4	N/A	
FM 802: FM 1419 Connector	0.0	8.0	N/A	
W. Merryman Road (From FM 1421 To US 77/83)	48.5	33.0	Resaca del Rancho Viejo	Crossing over 20 miles upstream of Laguna Madre
FM 1732 extension (Naranjo Road)	9.6	21.8	N/A	
Robindale Road	17.4	11.9	Resaca del Rancho Viejo	Crossing over 15 miles upstream of Laguna Madre
US 281	0.0	36.4	N/A	
LP 499	0.0	6.4	Arroyo Colorado	Crosses segment impaired for bacteria and mercury
FM 509 Ext.	181.8	53.3	N/A	
FM 509	0.0	27.4	Resaca del Rancho Viejo	Crossing over 15 miles upstream of nearest outfall to Arroyo Colorado Above Tidal/Arroyo Colorado Tidal Boundary
FM 2520	0.0	10.2	N/A	
Bus. 77 S.	0.0	15.7	Arroyo Colorado	Crosses segment impaired for bacteria and mercury
			Resaca de los Fresnos	Crossing approximately 9 miles upstream of nearest outfall to Arroyo Colorado Above Tidal/Arroyo Colorado Tidal Boundary
SH 345	0.0	4.4	Resaca de los Fresnos	Crossing approximately 5 miles upstream of nearest outfall to Arroyo Colorado Above Tidal/Arroyo Colorado Tidal Boundary
FM 732 Realignment	37.8	15.6	N/A	
FM 1846	0.0	7.3	N/A	
FM 106	0.0	19.5	Arroyo Colorado	Crosses segment impaired for bacteria and mercury
Dixieland	4.1	5.0	Arroyo Colorado	Crosses segment impaired for bacteria and mercury

Roadway Project	Additional ROW (acres)	Additional Impervious Cover (acres)	Waterbodies Crossed	Impairment Status/ Crossing Location in Relation to Impaired Streams
Dixieland-Thieme-Nixon-Pennsylvania	94.6	34.7	Resaca del Rancho Viejo and Resaca de los Fresnos	Crossings are both located approximately 9 miles upstream of nearest outfall to Arroyo Colorado Above Tidal/Arroyo Colorado Tidal Boundary
Grimes Extension/Cemetery Rd.	34.9	15.7	N/A	
Haine Drive/Russel	4.7	3.2	N/A	
Shafer Road	3.6	4.4	N/A	
Pinehurst Extension	5.8	5.0	Arroyo Colorado	Crosses segment impaired for bacteria and mercury
Primera Road	0.0	12.5	N/A	
Stuart Place Road	0.0	1.5	N/A	
Chester Park Road	15.5	13.2	N/A	
Turner/Yost Road	0.0	6.6	N/A	
Turner/Yost-East/West Connector	9.7	8.2	Resaca del Rancho Viejo	Crossing approximately 9 miles upstream of nearest outfall to Arroyo Colorado Above Tidal/Arroyo Colorado Tidal Boundary
Total	**2506.6**	**1129.0**		

Source: Brownsville Metropolitan Planning Organization (2007) and Harlingen-San Benito Metropolitan Planning Organization (2004)

Additionally, the LANWR Proposed Refuge Expansion Plan (USFWS 1999)[1] proposes the acquisition of an additional 114,637.5 acres within the RSA.

6.3.2.6 Step 6: Cumulative Impacts Assessment – Surface Water Quality

In this step, cumulative impacts are identified and the magnitude of those effects is evaluated.

In addition to effects from agricultural practices and unregulated development (colonias), the quality of surface water is correlated to the degree to which an area is developed. Some researchers estimate that water quality begins to decline when impervious cover exceeds as little as 10.0 percent of a watershed, and severe degradation may occur between 30.0 and 70.0 percent imperviousness (Klein 1979, Leopold 1968). Impervious cover estimates for the study area are unavailable and methods to meaningfully analyze them have limitations. Therefore, this cumulative impacts assessment relies on available geographic information system land use data. For these reasons, it is important to review relevant local and state regulations governing development within the RSA.

Under Section 303(d) of the Clean Water Act, states are required to develop lists of impaired waters and develop total maximum daily load plans to calculate the maximum amount of a pollutant that a waterbody can receive and still meet a given water quality standard. These impairments are, in part, a function of historical (and many cases pre-regulatory) changes to the land around these waterways and introduced stress placed upon them by land use changes. A

[1] Estimate based on a geographic information system analysis of Expansion Plan information, geographic information system city limits data, and 2nd Access Proposed ROW. Area within city limits/extraterritorial jurisdictions and 2nd Access Proposed ROW were subtracted from mapped acquisition area.

total maximum daily load for addressing the safety of fish consumption from the Arroyo Colorado was implemented in 2001 (TCEQ and TSSWCB 2008).

The TCEQ assumed the authority to administer the Texas Pollutant Discharge Elimination System stormwater permit program in Texas as the Texas Pollutant Discharge Elimination System permit program in 1992. Cameron County initiated the development of a storm water management program with the development of the Cameron County Storm Water Management Plan (2008). Measurable goals and an implementation schedule for the best management practices are identified within this plan. Accordingly, development that is indirectly influenced by the project may commonly be subject to two Texas Pollutant Discharge Elimination System water quality regulations. Future construction activities that disturb one or more acres (or less in some cases) would be required to obtain authorization under Texas Pollutant Discharge Elimination System general permit TXR150000. This permit requires controls and best management practices to reduce erosion, reduce suspended solids and for control of spills from construction activity. Moreover, future commercial development is subject to Texas Pollutant Discharge Elimination System general permit TXR050000, requiring best management practices to eliminate or reduce contamination of stormwater from industrial activities. The effectiveness of the selected best management practices and success in achieving the selected measurable goals will be reviewed annually. A summary of water quality measures in effect in the RSA, as well as their respective associated acreages of jurisdiction, are given in **Table 6-10.**

Table 6-10: Water Quality Ordinances in Effect within the Water Quality RSA

Jurisdiction	Ordinance/Measure	Prominent Water Quality Protection Features	Acreage Within Study Area
City of Brownsville	Vegetation Article III - Landscaping	General Purpose – Improvement of water quality, reduction of soil erosion	93,175
City of Harlingen	Title 5, Chapter 52 of the Code of Ordinances	Water pollution control	6,139
Cameron County	Storm Water Management Plan	-Illicit Discharge Detection and Elimination -Construction Site Storm Water Controls -Post Construction Storm Water Management -New Development/Redevelopment -Pollution Prevention / Good Housekeeping -Municipal Operations	618,555
State of Texas	-Surface Water Quality Mgmt. Programs (Nonpoint Source Program, Storm Water Quality Management Program) -Stormwater/Wastewater Permits (Storm Water Pollution Prevention Plan, MS4) - Total Maximum Daily Load Program	Removal of 80 percent of the net increase in total suspended solids	throughout

Sources: TCEQ, City of Brownsville, City of Harlingen, Cameron County (2008)

Analysis of data for subdivisions, roadway information and aerial photo interpretation indicates that approximately 65,542.1 acres has been developed or is currently being developed since 1977. The majority of this past and present development is characterized by low density, suburban residential land use. Another 119,219 acres of the land was preserved either fee simple or through conservation easements as parks, preserves or conservation lands. These lands are restricted from development or, in a very few cases, are limited to very low density/low impact residential development in accordance with agreements made with environmental agencies, conservation groups and/or local entities.

The current action accounts for approximately 9.9 to 36.7 acres of additional impervious cover depending on the build alternative within the water quality RSA. In addition, a projected 402.1 acres of induced development could occur within the RSA as a result of the proposed 2nd Access Project.

Up to 6,665.8 acres of land within the RSA could be developed from reasonably foreseeable future actions. These include approximately 5,139.8 acres of developments planned and platted within the RSA, approximately 1,129.0 acres of additional roadways not part of the CCRMA System, and approximately 397.0 acres of additional development associated with full build out of the CCRMA System. An estimated 114,637.5 acres of land is proposed for acquisition for the LANWR (USFWS 1999).[2]

Refer to **Table 6-11** for a summary of the potential cumulative effect area within the RSA.

Table 6-11: Potential Cumulative Effect Area within the Water Quality RSA

Type of Action	Past/Present Actions*	Current Action	Reasonably Foreseeable Actions	Cumulative Effect**
Development	44,174.2 acres of development between 1977 and 2008 25,316.1 acres currently subdivided and under development Total = 95,542.1 acres of development	Direct impact – Max. 36.7 acres** Indirect Impact – approximately 402.1 acres of induced development Total = 438.8 acres of development	Approx. 5,139.8 acres of subdivisions Approx. 1129.0 acres of other roadway projects (not CCRMA) Approx. 397.0 acres induced development from other CCRMA projects. Total = 6,665.8 acres	102,646.7 acres of development
Conservation	119,219.0 acres of parks, refuge and other water quality protection land	-	Potential for addition of 114,637.5 acres to LANWR	233,856.5 acres of parks, refuge and other water quality protection land
Ratio (D:C)***	-	-	-	1:4.2

Source: HNTB 2009; TXP, Inc. 2009
* Assumes that subdivisions currently being developed will continue to develop prior to the letting date of the 2nd Access Project.
**Incorporates highest potential direct impact.
***Ratio of Development acreage to Conservation acreage

6.3.2.7 Step 7: Results – Surface Water Quality

Poor quality stormwater runoff from agricultural areas, unregulated development and increases in impervious cover would be the most likely causes of water quality degradation within the water quality RSA. Regarding impervious cover, Klein (1979) estimated that impairment of surface water quality can be prevented if impervious cover is limited to 15.0 percent, in general, and 10.0 percent for sensitive aquatic systems. **Table 6-12** presents development rates required to achieve this standard.

[2] Estimate based on a geographic information system analysis of Expansion Plan information, geographic information system city limits data, and 2nd Access Proposed ROW. Area within city limits/extraterritorial jurisdictions and 2nd Access Proposed ROW were subtracted from mapped acquisition area.

Table 6-12: Allowable Watershed Development Rates

Land Use Category	Imperviousness (percent)	Maximum Amount of Watershed that can be Developed Based on an Imperviousness of	
		10 percent	15 percent
Individual Homes			
0.40 Hectare (1.00 acre) Lot	20	50	75
0.20 Hectare (0.50 acre) Lot	25	40	60
0.13 Hectare (0.33 acre) Lot	30	33	50
0.10 Hectare (0.25 acre) Lot	38	26	29
0.05 Hectare (0.12 acre) Lot	65	15	23
Townhouse/Garden Apartments	44	22	33
High-rise Residential	56	18	27
Industrial Districts	75	13	20
Commercial/Business Area	85	12	18
Shopping Centers	95	11	16

Source: Klein (1979)

In comparison, approximately 14.8 percent of the water quality RSA has already developed in the past or is planned for development in the foreseeable future (including the current action). Compared with the development rates in **Table 6-12** and in consideration of average water quality RSA lot size (0.57 acre), water quality RSA development is currently at 13.8 percent. The proposed 2nd Access Project and reasonably foreseeable future actions could increase development within the RSA by 1.0 percent, which is below the impervious threshold of 15 percent. Therefore, the cumulative effect of development is not expected to substantially affect current surface water quality in the RSA.

Aside from the amount of impervious cover, water quality in RSA watersheds would be expected to improve over time given regulatory actions such as the Cameron County Storm Water Plan, the TCEQ Total Maximum Daily Load Program, City ordinances discussed previously, and measures such as the Arroyo Colorado Watershed Protection Plan (Step 8).

Waters of the U.S. are regulated by the USACE under authority of Section 404 of the Clean Water Act. Section 404 of the Clean Water Act authorizes the USACE to issue permits for the discharge of dredged or fill material into waters of the U.S., including wetlands. The intent of this law is to protect the nation's waters from the indiscriminate discharge of material capable of causing pollution, and to restore and maintain their chemical, physical and biological integrity. Any discharge into waters of the U.S. must be in accordance with Section 404(b)(1) guidelines developed by the Environmental Protection Agency (EPA) in conjunction with the USACE. In the Section 404 permit process, permit applications are reviewed by the USACE for compliance with Section 401 of the Clean Water Act. In summary, the proposed project's impact to surface water quality would be avoided or minimized by compliance with the USACE nationwide and individual permit programs. As a result, the proposed project would not contribute to significant cumulative impacts to the quality of surface waters of the U.S.

The threats to listed species vulnerable to poor surface water quality were reviewed to understand the potential cumulative effect within the water quality RSA on these species. Potential cumulative effects to which the current action could contribute include potential health

effects from contaminants found in stormwater runoff or hazardous materials spills and degradation of habitat by increased sediments. Because construction projects in the RSA would be subject to Texas Pollutant Discharge Elimination System requirements, the release of any potential contaminants would be minimized and abated.

3.6.2.8 Step 8: Mitigation – Surface Water Quality

It is anticipated that the development trend would continue as the region continues to grow. However, if development rates increase in intensity, local surface water quality could degrade over time. Thus, it becomes more crucial that water quality protections are strengthened where needed, fully implemented and consistently enforced.

It is impossible to discuss water quality in the region without addressing mitigation measures, as the value of mitigation and the foresight of local planners to improve and maintain water quality in this sensitive ecosystem has been at the forefront of legislation and rulemaking. Above in Step 6 are descriptions of regulatory measures implemented by local jurisdictions, Cameron County and the State of Texas (**Table 6-10**).

In addition, a number of regional initiatives have been undertaken within the surface water quality RSA in an effort to improve surface water quality. These include the Cameron County Storm Water Plan (*Step 7*) and the Arroyo Colorado Watershed Protection Plan and YardWise Public Outreach Program.

The Arroyo Colorado Watershed Protection Plan calls for the voluntary adoption of agricultural best management practices on 33.0 percent of the irrigated cropland by 2010 and 50.0 percent by 2015 (TCEQ and TSSWCB, 2008). In response, local Storm Water Control Districts received a Clean Water Act Section 319(h) Nonpoint Source Grant to implement best management practices on agricultural land in the Arroyo Colorado. Through this program, 123 Water Quality Management Plans (WQMPs) have been developed in the watershed, protecting over 6,400 acres. The best management practices being implemented include irrigation land leveling, residue management, conservation crop rotation, nutrient management, pasture planting and prescribed grazing. Best management practices installed in 2008 provided load reductions of 132 tons of sediment, 126 pounds of phosphorus and 752 pounds of nitrogen. The Arroyo Colorado Watershed Partnership has grown to over 700 members.

The goal of the YardWise Public Outreach Program, also funded by a Clean Water Act Section 319(h) NPS Grant, is to reduce the discharge of landscaping chemicals into streams, lakes and aquifers in major metropolitan areas statewide, including the Brownsville metropolitan area (TCEQ and TSSWCB 2008) .

In addition, TCEQ's Arroyo Colorado Watershed Protection Plan provides financial assistance to the cities of San Juan, San Benito and La Feria to enhance water quality through the design, construction, maintenance, operation and monitoring of wetlands that will receive treated effluent from municipal wastewater treatment facilities and stormwater runoff. Construction of the wetlands in La Feria and San Benito began in 2009 (TCEQ and TSSWCB 2008).

Regulatory controls are an important component of assuring that future impacts to surface waters and wetlands are minimized. The cumulative impact of reasonably foreseeable future actions to the quality of waters of the U.S. could be minimized by adherence to applicable USACE, USFWS, TPWD and U.S. Coast Guard regulations for projects subject to state and federal jurisdiction. Reliance on regulatory programs to ensure future environmental protection

does not provide complete protection of the regulated resource. Regulations are subject to violation, and not all impacts to waters of the U.S. would be permitted or reported and not all violations would be discovered and pursued by regulatory agencies. There is some likelihood that minor regulatory infractions would occur in conjunction with future development in the RSA, resulting in water quality impacts.

The CCRMA would coordinate the project with TCEQ by sending copies of the South Padre Island Proposed 2nd Access Project draft environmental impact statement and final environmental impact statement documents for their review and comments regarding 303(d) waters.

6.3.3 Waters of the U.S - Freshwater Wetlands

6.3.3.1 Step 1: Resource Identification - Freshwater Wetlands and Waters of the U.S.

The resource is all freshwater wetlands and freshwater streams, lakes and ponds identified on the USFWS NWI occurring within the RSA (**Step 2**). NWI freshwater wetlands in the RSA include temporarily and seasonally flooded palustrine emergent, shrub, and forested wetlands, as well as freshwater ponds, NWI wetlands are based on a USFWS classification system, which provides a general indicator of the presence of potential jurisdictional wetlands as defined and regulated by the USACE under Section 404 of the Clean Water Act. The importance of wetlands for healthy ecological function and wildlife habitat and concern for wetland loss as expressed in the national no-net-loss policy, make analysis necessary.

Cameron County freshwater wetlands are broadly classed as riparian or prairie pothole marshes. The lower coast riparian wetlands are associated with the wide buffer of the Rio Grande delta encompassing most of southern and eastern Cameron County. Resacas are the ancient riverine oxbow features associated with the Rio Grande. Pothole and marsh depressions describe any freshwater depression forming on flat terrain such as the coastal plain of Cameron County. Pothole wetlands occur throughout the entire Texas coastal plain, including much of the RSA. Very little descriptive work has been done on these wetlands. Since RSA pothole wetlands occur in a semi-arid climate, the hydroperiod is typically short, but of enough duration for wetland vegetation to have developed in these depressions (Moulton and Jacob 2003).

6.3.3.2 Step 2: RSA – Freshwater Wetlands

The RSA for freshwater wetlands is shown in **Exhibit 6-3**. The land area for the freshwater wetlands RSA is the same as the land area for the Water Quality RSA (**Section 6.3.2**). The freshwater wetlands RSA comprises approximately 618,297 acres. Approximately 119,219 acres is currently preserved and unavailable for development. Approximately 95,542.1 acres is developed or currently under development (**Section 6.3.3.3**); therefore, the developable RSA comprises approximately 499,078.0 acres.

6.3.3.3 Step 3: Resource Health and Historical Context – Freshwater Wetlands

Land use changes including conversion to agricultural use typically drive loss of wetlands. The first national statistical estimate of wetland losses evaluated the trend of losses between the mid-1950s and 1970s. The estimated loss of wetlands during that time period was 485,000 acres per year, primarily due to the draining of wetlands for agriculture (Frayer, et al. 1983). From the mid-1970s to the 1980s, the trend decreased to 290,000 acres per year (Dahl, et al.

1991). A third national status and trend report was published in 2000 and produced an estimate of 58,500 acres of wetlands lost annually between 1986 and 1997. The latest national status and trend report estimates an annual net gain of 32,000 acres of wetlands between 1998 and 2004. However, this report also documented that approximately 88,960 acres and 51,440 acres of wetlands were lost to urban and rural development respectively. These losses were offset by wetland conservation initiatives in agricultural lands and wetland mitigation efforts.

Agriculture was once the greatest cause of the loss of prairie potholes and marshes. Because of extensive land leveling for agriculture, there are very few intact pothole wetland complexes left with the full range of their original elevational relief (Moulton and Jacob 2003). Urban sprawl is probably the cause of greatest loss today. Some of the best remaining complexes are in urban fringe areas, and are therefore subject to the greatest threat from development. According to the Texas Coastal Wetlands Guidebook, federal wetland regulatory protection has not prevented the loss of these wetlands; therefore, the cumulative loss has been significant. On the entire Texas coastal plain, freshwater marshes have decreased by 29.0 percent since the mid-1950s, a net loss of more than 235,000 acres. This loss, however, has been concentrated on the upper and middle Texas coast. Loss of Texas coastal wetlands between 1955 and 1992 was not uniform along the entire Texas coast, however. In Cameron County, loss of coastal wetlands during this period to agriculture, urban development and rural development was considered minimal (Moulton, et al. 1997).

The NWI maps (1994) for the freshwater wetland RSA identify approximately 32,307.1 acres of freshwater wetlands, or approximately 5.2 percent of the RSA and approximately 1,010 miles of linear waters (streams and canals). Approximately 18,035.2 acres (2.9 percent) are unprotected and therefore potentially developable. Based on examination of 1977 and 2008 aerial photography, an estimated 26,051.8 acres (4.2 percent) of the RSA was developed in 1977 and approximately 70,226.0 acres (11.4 percent) of the RSA was developed in 2008. Additionally, a total of 651 of the RSA's 1,709 subdivisions (**Table 6-8**), totaling approximately 25,316.1 acres (4.1 percent), are currently at some level of development. A geographic information system was used to calculate the acreage of impact to NWI freshwater wetlands from the development between 1977 and 2008. A total of 325.5 acres of freshwater wetlands were impacted by new development. However, since the NWI data is from 1994, the 325.5 acres of wetlands is not necessarily representative of the total impacts to freshwater wetlands between 1977 and 2008.

Numerous wetland conservation measures have been established in recognition that wetland loss is detrimental to surface and ground water quality, is associated with loss of wildlife values such as hunting and bird watching, and has potential to imperil a number of plant and animal species dependent upon these areas.

The Clean Water Act of 1972 employs regulations requiring reduction of direct pollutant discharges into waterways, and is designed to protect the chemical, physical and biological integrity of the nation's waters, including freshwater wetlands, so that they can support fish and wildlife populations and recreational activities. The Wetland Reserve Program, established by the 1990 U.S. Department of Agriculture Farm Bill and reauthorized in 1996 and 2002, is a voluntary program offered through the National Resources Conservation Service that provides incentives for landowners to protect, restore and enhance wetlands on their property. The 1986 Emergency Wetlands Resources Act authorized expanded funding for the purchase of wetlands, mandated a National Wetlands Priority Conservation Plan, and required the states to include wetlands in their Comprehensive Outdoor Recreation Plans. The 1989 North American Wetlands Conservation Act provides matching grants to organizations and individuals who have

developed partnerships to carry out wetland conservation projects. The 1981 Texas Waterfowl Stamp Act has funded the majority of waterfowl habitat management, research and acquisition in Texas. The 1991 Texas Coastal Coordination Act led to development of a comprehensive coastal program including designation of areas of particular concern (coastal natural resource areas). The Texas Wetlands Conservation Plan provides incentives for voluntary conservation and restoration of Texas wetlands.

These and other measures have had a positive influence on wetland conservation and management in Texas (Moulton, et al. 1997). These measures have been instrumental in wetland conservation in the RSA as well.

6.3.3.4 Step 4: Direct and Indirect Impacts – Freshwater Wetlands

The proposed project would have direct impacts ranging from 6.0 to 38.1 acres to freshwater wetlands, depending on the build alternative and any wetland acreage affected by underground utility relocation outside the proposed 2nd Access ROW, if required (**Table 6-13**). No streams would be impacted by any alternative.

Table 6-13: Direct Freshwater Wetland Impacts By Alternative

Alternative	Freshwater Wetlands (acres)
1	6.3
2	38.1
3	35.3
4	6.2
5	38.1
6	12.1
7	22.3
8	6.2
9	6.0
10	12.1
11	22.3

According to *Proposed South Padre Island Second Access Project Economic Analysis*, an estimated 402.1 acres of induced development (239.8 acres on South Padre Island and 162.3 acres on the mainland) could occur by 2045 as a result of the proposed 2nd Access Project above the No-Build Alternative (TXP, Inc. 2009). NWI freshwater wetlands primarily occur on the mainland, and a maximum of approximately 13.6 acres of freshwater wetlands could be impacted from development induced by the proposed 2nd Access Project. This estimate may not be a practical assumption of total impacts, because regulations provide some protection for wetlands against development.

6.3.3.5 Step 5: Reasonably Foreseeable Actions – Freshwater Wetlands and Waters of the U.S.

Except for Gulf of Mexico waters, the freshwater wetland RSA boundary mirrors the surface water quality RSA; therefore, reasonably foreseeable development activity for the current RSA is identical to that for the water quality RSA. A total of 173 subdivisions, totaling approximately 5,139.8 acres, are slotted for future development (all parcels and platted lots vacant). Subdivision information for the RSA is listed in **Table 6-8** (**Section 6.3.2.5**).

Similarly, proposed roadway projects for the freshwater wetlands RSA are identical to those for the surface water quality RSA. According to *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009), an additional 397.0 acres of induced development beyond that induced by 2nd Access could occur by 2045 as a result of full build-out of the other CCRMA roadway projects, with a potential for conversion of freshwater wetlands from this induced development. Similarly, additional induced development, with associated potential for wetland impacts, could result from full build-out of Brownsville and Harlingen-San Benito Metropolitan Planning Organization and TxDOT Surface Transportation Improvement Plan Project roadways (**Table 6-9, Section 6.3.2.5**). To summarize, there are approximately 45 roadway improvement projects foreseeable in the RSA, totaling approximately 2506.6 acres of new ROW.

The LANWR Proposed Refuge Expansion Plan (USFWS 1999)[3] includes plans to acquire an additional approximately 114,637.5 acres within the RSA.

6.3.3.6 Step 6: Cumulative Impacts Assessment – Freshwater Wetlands

In this step, cumulative impacts are identified and the magnitude of those effects is evaluated.

Development pressure is the main threat to wetlands in the RSA; therefore, it is important to review relevant regulations related to development impacts to wetlands within the RSA.

In 1991, Texas adopted state goals for "no net loss" of acreage or aquatic function of wetlands. These goals reflect the regulatory program in the Clean Water Act legislation that prohibits the discharge of fill into waters of the U.S. unless authorized by a permit issued under the Clean Water Act Section 404. The USACE has authority over such actions and may require the permit holder to restore, create, enhance or preserve nearby aquatic features as compensation to offset unavoidable adverse impacts to the aquatic environment. This means of compensatory mitigation is intended to comply with the general goals of the Clean Water Act and the specific goal of "no net loss" of aquatic functions. Several regulations have been enacted on a federal, state and local level to achieve these goals, as detailed in Step 3.

Analysis of data for subdivisions, roadway information and aerial photo interpretation indicates that approximately 95,542.1 acres of the freshwater wetlands RSA has already been fully developed or is currently under development. Between 1977 and the present, approximately 69,490.3 acres were developed or are currently under development, with a total impact to approximately 325.5 acres of freshwater wetlands. The majority of this past development is characterized by low density, suburban residential land use. Another 119,219 acres of the land, encompassing approximately 14,271.9 acres of freshwater wetlands, was preserved either fee simple or through conservation easements such as parks, preserves, or conservation lands. These lands are restricted from development or, in a very few cases, are limited to very low density/low impact residential development in accordance with agreements made with environmental agencies, conservation groups and/or local entities.

The current action accounts for approximately 287.0 to 466.9 acres, depending on the build alternative, within the freshwater wetland RSA, with a maximum of 38.1 acres of impact to freshwater wetlands. In addition, approximately 402.1 acres of induced development could

[3] Estimate based on a geographic information system analysis of Expansion Plan information, geographic information system city limits data, and 2nd Access Proposed ROW. Area within city limits/extraterritorial jurisdictions and 2nd Access Proposed ROW were subtracted from mapped acquisition area.

occur from the proposed 2nd Access Project, of which approximately 13.6 acres could impact freshwater wetlands.

Reasonably foreseeable future actions include developments currently planned and platted within the RSA, induced development from other CCRMA projects, and future roadway projects not within the CCRMA System. These future actions account for another approximately 6,665.8 acres within the RSA. An estimated 114,637.5 acres of land, encompassing approximately 10,346.1 acres of freshwater wetlands, is proposed for acquisition for the LANWR (USFWS 1999).[4]

To summarize, approximately 325.5 acres of freshwater wetlands have been impacted by development between 1994 and 2008. There could be approximately 1,131.5 acres of impact to freshwater wetlands from current development. A maximum of approximately 38.1 acres of freshwater wetlands could be impacted by the proposed 2nd Access Project. Potentially, 13.6 acres of freshwater wetlands could be impacted by induced development due to the 2nd Access project (402.1 acres total development). Approximately 359.5 acres of impacts could occur to freshwater wetlands from future actions within the RSA.

Refer to **Table 6-14** for a summary of the potential cumulative effect area within the RSA.

[4] Estimate based on a geographic information system analysis of Expansion Plan information, geographic information system city limits data, and 2nd Access Proposed ROW. Areas within city limits/extraterritorial jurisdictions and 2nd Access proposed ROW were subtracted from mapped acquisition area.

Table 6-14: Potential Cumulative Effect Within The Freshwater Wetland RSA

Type of Action	Past/Present Actions*	Current Action	Reasonably Foreseeable Actions	Cumulative Effect**
Development	Approx. 26,051.8 acres development in 1977 Approx. 70,226.0 acres development in 2008 Approx. 25,316.1 acres currently under development Total = 95,542.1 acres development Impacts to freshwater wetlands between 1994 and 2008 = 325.5 acres Potential impacts to freshwater wetlands from current development = 1,131.5 acres Total impacts to freshwater wetlands = 1,457.0 acres	Direct Impact - max. 38.1 acres Indirect Impact – approx. 13.6 acres of induced development Total impacts to freshwater wetlands = 51.7 acres	5,139.8 acres of subdivisions Max. 397.0 acres induced development from other CCRMA projects 2,491.0 acres of roads Total acres of future actions = 8,027.8 acres Potential impacts to freshwater wetlands = 359.5 acres	1,868.1 acres impact to freshwater wetlands
Conservation	119,219 acres of parks, refuge and other water quality protection land	-	Potential for addition of 114,637.5 acres to LANWR	233,856.5 acres parks, refuge and other water quality protection land (23,156.7 acres wetlands)
Ratio (D:C)***	-	-	-	1:12.4 (wetlands)

Source: HNTB (2009)
* Assumes that subdivisions currently being developed will continue to develop prior to the letting date of the 2nd Access Project.
**Incorporates highest potential direct impact.
***Ratio of Development acreage to Conservation acreage

6.3.3.7 Step 7: Results – Freshwater Wetlands

The threats to wetland loss were reviewed to understand the potential cumulative effects to freshwater wetlands, including the waters of the U.S., in the RSA. Potential cumulative effects to which the current action could contribute include direct conversion of wetland and threats to wetland water quality from increased sediments and contaminants found in stormwater runoff or hazardous material spills originating from the roadway.

Development pressure would be the most likely cause of wetland loss within the freshwater wetland RSA. Approximately 15.5 percent of the freshwater wetland RSA has already developed in the past or is planned for development in the foreseeable future (including the current action).

However, as stated in *Step 3*, historic loss of coastal wetlands in Cameron County is considered minimal compared with the wetland loss in other Texas coastal counties (Moulton, et al. 1997).

Moreover, numerous wetland conservation measures exist (*Step 6, Step 8*). Lastly, while an estimated 18,035.2 acres of freshwater wetland areas are potentially developable, a high proportion exists within the 100-year floodplain, limiting the potential for their development.

Regulatory controls are an important component of assuring that future impacts to surface waters and wetlands are minimized. Waters of the U.S. are regulated by the USACE under authority of Section 404 of the Clean Water Act. Section 404 of the Clean Water Act authorizes the USACE to issue permits for the discharge of dredged or fill material into waters of the U.S., including wetlands. The intent of this law is to protect the nation's waters from the indiscriminate discharge of material capable of causing pollution, and to restore and maintain their chemical, physical and biological integrity. Any discharge into waters of the U.S. must be in accordance with Section 404(b)(1) guidelines developed by the EPA in conjunction with the USACE. In the Section 404 permit process, permit applications are reviewed by the USACE for compliance with Section 401 of the Clean Water Act. Section 401 water quality certification is administered by the TCEQ.

In summary, the proposed project's impact to wetlands would be avoided or minimized by compliance with the USACE nationwide and individual permit programs as well as with TCEQ water quality certification. The proposed project's impact to freshwater wetlands would be minimized by design undertaken in consultation with the USFWS and TPWD and by compliance with federal and state laws. As a result, the proposed project would not substantially contribute to significant cumulative impacts to waters of the U.S., including wetlands.

The cumulative impact of reasonably foreseeable future actions to waters of the U.S. within the RSA could be minimized by adherence to applicable USACE and TCEQ regulations for projects subject to state and federal jurisdiction.

Finally, because of the success of no net loss policies and the abundance of preservation lands in the RSA, the cumulative effect of development is expected to retain a large proportion of freshwater wetlands in the RSA.

6.3.3.8 Step 8: Mitigation – Freshwater Wetlands

It is anticipated that the current development trend would continue as the region continues to grow. However, if development rates increase in intensity, wetland loss could occur over time. Thus, it becomes more crucial that wetland loss protections are strengthened where needed, fully implemented and consistently enforced.

It is impossible to discuss loss of waters of the U.S., including wetlands, in the region without addressing mitigation measures and the foresight of local planners to mitigate wetland loss. Above in *Step 3* and *Step 6* are descriptions of mitigative and regulatory measures implemented by local jurisdictions as well as a summary of USACE requirements.

In addition, a number of initiatives have been undertaken within the RSA, many of which include conservation of U.S. waters and wetland wildlife habitats. These include establishment of three national wildlife refuges (Laguna Atascosa, Santa Ana, Lower Rio Grande Valley), two state wildlife management areas (Las Palomas, Arroyo Colorado), two state parks (Boca Chica, Resaca de la Palma) Sabal Palm Audubon Sanctuary (Audubon Society) and Lennox Foundation Southmost Preserve (Nature Conservancy).

An example of local compliance with no net loss policies is wetland mitigation by the Cameron County Irrigation District No. 2 in conjunction with irrigation improvement projects, in which 128

acres of resaca wetland impacts will be mitigated off-site (Cameron County Irrigation District No. 2 2003). An example of local interest in wetland preservation is identification of underutilization and mismanagement of urban resacas in the City of Brownsville's Comprehensive Plan (2009). The Plan cites water quality and habitat degradation as major concerns in these areas due to local landscaping practices and unchecked development, as well as lack of awareness regarding the importance of these areas for ecological function and eco-tourism, for example bird watching.

An example of a program with incidental potential for protecting wetlands is the 2008 Federal Emergency Management Agency buyout of Del Mar Heights, a Cameron County residential area subject to frequent flooding, through the Hazard Mitigation Grant Program (FEMA 2008). In this program, residents were relocated to alternate housing outside the 100-year floodplain. While not explicitly a wetland protection program, wetlands are common in 100-year floodplain areas in Cameron County.

Reliance on regulatory programs to ensure future environmental protection does not provide complete protection of the regulated resource. Regulations are subject to violation, and not all losses of waters of the U.S. would be permitted or violations reported and pursued by regulatory agencies. There is a high likelihood that minor regulatory infractions would occur in some of the approximately 255,070.4 acres of developable land[5] in the RSA, resulting in limited unpermitted and unmitigated impacts to waters of the United States, including wetlands. Impacts which are compliant with the NWP are anticipated to have minor impacts. Those which are non-compliant may result in unmitigated loss of both stream and wetland habitat.

It is important to stress with regard to this project that all impacts to jurisdictional waters associated with this project would be mitigated in compliance with all applicable regulatory standards. The CCRMA would coordinate the project with the EPA, USACE, USFWS, NMFS, USCG, GLO, and TCEQ by sending copies of the South Padre Island Proposed 2nd Access Project draft environmental impact statement and final environmental impact statement documents for their review and comments regarding wetland impacts.

6.3.4 Waters of the U.S. - Estuarine Wetlands

6.3.4.1 Step 1: Resource Identification - Estuarine Wetlands

The resource is defined as all estuarine wetland types identified on the NWI within the RSA (**Step 2**) excluding deepwater areas (Laguna Madre), but including salt marshes and mud and salt flats. NWI estuarine wetlands in the RSA include subtidal and intertidal unvegetated, algal flat, emergent, and shrub wetlands. NWI wetlands are based on a USFWS classification system, which provides a good approximation of jurisdictional wetlands as defined and regulated by the USACE under Section 404 of the Clean Water Act. There are approximately 33,454.6 acres of developable estuarine wetlands within the RSA. The importance of estuarine wetlands for healthy ecological function and wildlife habitat, and concern for wetland loss as expressed in the national no net loss policy, make analysis necessary.

Cameron County estuarine wetlands are broadly classed as marshes (vegetated) or flats (unvegetated). Marshes are found in areas protected from wave action, which prevents establishment of vegetation. Both types of estuarine wetland are subject to tidal influence (Moulton and Jacob 2003).

[5] Land not protected from development, not currently in a subdivision, and not in the 100-year floodplain.

6.3.4.2 Step 2: RSA – Estuarine Wetlands

The RSA for estuarine wetlands is shown in **Exhibit 6-4**. NWI estuarine wetlands in the RSA are primarily concentrated adjacent to the Gulf and Laguna Madre from northern to southern Cameron County. The estuarine wetlands RSA comprises 243,103 acres.

6.3.4.3 Step 3: Resource Health and Historical Context – Estuarine Wetlands

Estuarine marsh loss can occur from dredging and fill activities. Loss is also associated with land subsidence and sea level rise, which impacts marsh vegetation, converting marsh habitats to open water areas. Channels dredged in marshes can allow excessive tidal saltwater intrusion into marshes, affecting vegetation communities. Damming of freshwater channels inland can affect freshwater inflows, affecting salinity. As with freshwater wetlands, runoff pollution from urban and agricultural sources can affect wetland function. Salt and brackish marshes on the Texas coast have experienced an 8.0 percent decline in salt marsh since the mid-1950s. Mud and salt flats have experienced even greater losses, decreasing 13.0 percent in the same period. Dredging for the Intracoastal Waterway is responsible for much of this loss, from site deposition of spoil materials (Moulton and Jacob 2003).

The NWI maps for the estuarine wetland RSA identify approximately 163,828.1 acres of estuarine wetlands in the RSA; approximately 96,386.6 acres of these are the open waters of the Laguna Madre. Of the remaining 67,441.5 acres, approximately 33,454.6 acres are unprotected and therefore potentially developable. Based on examination of 1977 and 2008 aerial photography, an estimated 3,574.7 acres (1.5 percent) of the estuarine wetlands RSA were developed in 1977 and approximately 5,065.5 acres (2.1 percent) were developed in 2008. There are currently 1906.1 acres currently in development. Therefore, approximately 6,971.6 acres (2.9 percent) of the estuarine wetlands RSA is currently developed or under development, and 96,386.6 acres are within the open waters of the Laguna Madre. Additionally, approximately 73,456.4 acres of the estuarine wetlands RSA is currently preserved. Therefore, 66,288.4 acres of the estuarine wetlands RSA are available for development.

Based on a geographic information system comparison of the 1994 NWI maps to the development that occurred between 1977 and 2008, there were approximately 283.6 acres of impact to estuarine wetlands from development. However, since the NWI data is from 1994, the 283.6 acres of wetlands is not necessarily representative of the total impacts to freshwater wetlands between 1977 and 2008.

Numerous wetland conservation measures have been established in recognition that wetland loss is detrimental to surface and ground water quality, is associated with loss of wildlife values such as hunting and bird watching, and has potential to imperil a number of plant and animal species dependent upon these areas.

The Clean Water Act of 1972 employs regulations requiring reduction of direct pollutant discharges into waterways, and is designed to protect the chemical, physical and biological integrity of the nation's waters, including freshwater wetlands, so that they can support fish and wildlife populations and recreational activities. The Wetland Reserve Program, established by the 1990 USDA Farm Bill and reauthorized in 1996 and 2002, is a voluntary program offered through the NRCS which provides incentives for landowners to protect, restore and enhance wetlands on their property. The 1986 Emergency Wetlands Resources Act authorized expanded funding for the purchase of wetlands, mandated a National Wetlands Priority Conservation Plan and required the states to include wetlands in their Comprehensive Outdoor Recreation Plans. The 1989 North American Wetlands Conservation Act provides matching grants to

organizations and individuals who have developed partnerships to carry out wetland conservation projects. The 1981 Texas Waterfowl Stamp Act has funded the majority of waterfowl habitat management, research and acquisition in Texas. The 1991 Texas Coastal Coordination Act led to development of a comprehensive coastal program including designation of Areas of Particular Concern (coastal natural resource areas). The Texas Wetlands Conservation Plan provides incentives for voluntary conservation and restoration of Texas wetlands. These and other measures have had a positive influence on wetlands conservation and management in Texas (Moulton, et al. 1997). This influence has also been realized for wetland conservation in the RSA.

6.3.4.4 Step 4: Direct and Indirect Impacts – Estuarine Wetlands

The proposed project would have direct impacts ranging from 5.1 acres to 19.8 acres of estuarine wetlands, depending on the build alternative and any wetland acreage affected by underground utility relocation outside the proposed 2nd Access ROW, if required (**Table 6-15**).

Table 6-15: Direct Estuarine Wetland Impacts By Alternative in the RSA

Alternative	Salt marsh (acres)	Mudflats (acres)	Total (acres)
1	0.0	16.7	16.7
2	0.0	17.7	17.7
3	0.0	19.8	19.8
4	2.3	13.5	15.8
5	2.3	14.6	16.9
6	2.4	13.8	16.2
7	2.4	14.8	17.2
8	0.0	5.4	5.4
9	0.0	6.2	6.2
10	0.0	5.1	5.1
11	0.0	6.1	6.1

Source: HNTB (2009)

According to *Proposed South Padre Island Second Access Project Economic Analysis*, an estimated 402.1 acres of induced development (239.8 acres on South Padre Island and 162.3 acres on the mainland) could occur by 2045 as a result of the proposed 2nd Access Project above the No-Build Alternative (TXP, Inc. 2009). As a result, there is the potential for the indirect conversion of 32.6 acres of estuarine wetlands to developed uses by the proposed 2nd Access Project.

6.3.4.5 Step 5: Reasonably Foreseeable Actions – Estuarine Wetlands

A total of 17 subdivisions totaling approximately 94.7 acres are slotted for future development (all parcels and platted lots vacant). Subdivision information for the RSA is listed in **Table 6-16**.

Table 6-16: Subdivisions in the Estuarine Wetlands RSA

Subdivision Name	No. of Lots	Acreage
SANTA ISABEL GRANT	9	6271.5
LAGUNA VISTA CLUB/TOWNESITE	22	750.2
SANTA ISABEL GRANT PORT ISABEL	81	687.7
PADRE BEACH SUBDIVISION	1,938	342.6
PORT ISABEL ORIGINAL TOWNSITE	919	178.8
LAGUNA VISTA ORIGINAL TOWNSITE	412	169.8
PADRE ISLAND UNSUBDIVIDED ABST 260	14	145.6
FIESTA ISLES SUBDIVISION	304	63.1
GARCIA BAYFRONT SUBDIVISION	13	58.7
PADRE BEACH ESTATES SUBDIVISION	52	57.8
MODERN VENICE SUBDIVISION	209	34.5
SPI GOLF COMMUNITY PHASE 1	7	19.4
SOUTH SHORE HEIGHTS ADDITION	111	15.7
SPI GOLF COMMUNITY PHASE II	26	13.7
PADRE BEACH ACRES SUBDIVISION	3	13.7
SPI GOLF COMMUNITY PARCEL 6 SUBD	15	13.4
SAIDA TOWERS 3 CONDOMINIUMS	1	13.0
THE VILLAS OF SOUTH PADRE SUBD	48	12.5
CONTRAN SUBDIVISION	2	12.2
RUTHERFORD- HARDING ADDITION	33	11.6
MIRAMAR & SAND PILES SUBD LT 1,2,3	4	11.5
THE PORT ISABEL HEB SUBDIVISION	2	11.2
WAL MART #413 SUBDIVISION	6	11.1
LAGUNA BEACH ADDITION I	22	10.9
TARPON FIELDS SUBDIVISION	45	10.4
LAGUNA BEACH ADDITION II	11	10.2
SPI GOLF COMMUNITY PARCEL 9 AMEND	21	10.0
SUBDIVISIONS > 10 ACRES (27)	4,330	8960.8
ALL SUBDIVISIONS < 10 ACRES (242)	1,226	420.1
TOTAL SUBDIVISIONS (269)	5,556	9,380.9

Source: Cameron County Appraisal District (2009)

Reasonably foreseeable transportation actions could impact an additional 46.5 acres within the RSA, and a total of 2.8 acres of estuarine wetlands within the RSA. These actions are listed in **Table 6-17**. NWI estuarine wetland acreage within the ROWs of proposed transportation projects, excluding the proposed project, is listed.

Table 6-17: Brownsville and Harlingen-San Benito Metropolitan Planning Organization and TxDOT Surface Transportation Improvement Plan Projects with Associated Waterbody Crossings

Roadway Project	Additional ROW (acres)	Additional Impervious Cover (acres)	Waterbodies Crossed	Estuarine wetland Within ROW
SH 48	0.0	28.8	San Martin Lake Bahia Grande	0.0
SH 100	17.7	0.0	Laguna Madre	2.8
Total	**17.7**	**28.8**		**2.8**

Source: Brownsville Metropolitan Planning Organization (2007) and Harlingen-San Benito Metropolitan Planning Organization (2004)

According to *Proposed South Padre Island Second Access Project Economic Analysis*, an additional 397.0 acres of induced development beyond that induced by the proposed 2nd Access Project could occur by 2045 as a result of full build-out of the other CCRMA roadway projects. It should be noted this projection for induced development only accounts for the effect of CCRMA Plan roadways. Additional induced development in the RSA could result from full build-out of Brownsville and Harlingen-San Benito Metropolitan Planning Organization and TxDOT Surface Transportation Improvement Plan Project roadways listed in **Table 6-17**.

The *Laguna Atascosa National Wildlife Refuge Proposed Refuge Expansion Plan* (USFWS 1999) includes plans to acquire an additional approximately 46,918.1 acres within the RSA[6], although, as discussed previously, there is no guarantee these areas will be acquired due to diminishing funding and increasing land values.

6.3.4.6 Step 6: Cumulative Impacts Assessment – Estuarine Wetlands

In this step, cumulative impacts are identified and the magnitude of those effects evaluated.

Development pressure is the main threat to wetlands in the RSA; therefore, it is important to review relevant regulations related to development impacts to wetlands within the RSA.

In 1991, Texas adopted state goals for “no net loss” of acreage or aquatic function of wetlands. These goals reflect the regulatory program in the Clean Water Act legislation that prohibits the discharge of fill into waters of the U.S. unless authorized by a permit issued under Clean Water Act Section 404. The USACE has authority over such actions and may require the permit holder to restore, create, enhance, or preserve nearby aquatic features as compensation to offset unavoidable adverse impacts to the aquatic environment. This means of compensatory mitigation is intended to comply with the general goals of the Clean Water Act and the specific goal of “no net loss” of aquatic functions. Several regulations have been enacted on a federal, state and local level to achieve these goals, as detailed in Step 3.

Analysis of data for subdivisions, roadway information and aerial photo interpretation indicates that approximately 6,971.6 acres has already been fully developed or is currently under development. Past development impacted an estimated 283.6 acres of estuarine wetlands. Estuarine wetlands comprise approximately 50.5 percent of the developable RSA; therefore, current development could impact approximately 962.0 acres of estuarine wetlands. The

[6] Estimate based on a geographic information system analysis of Expansion Plan information, geographic information system city limits data, and 2nd Access Proposed ROW. Area within city limits/extraterritorial jurisdictions and 2nd Access Proposed ROW were subtracted from mapped acquisition area.

majority of this past development is roadway and low density, suburban residential land use. Another 73,456.4 acres encompassing approximately 33,385.0 acres of estuarine wetlands was preserved either fee simple or through conservation easements such as parks, preserves, or conservation lands. These lands are restricted from development or are limited to very low density/low impact residential development in accordance with agreements made with environmental agencies, conservation groups and/or local entities.

The current action accounts for approximately 181.1 to 360.6 acres of additional development, depending on the build alternative, within the RSA. However, a maximum of 19.8 acres of estuarine wetlands would be impacted. In addition, an estimated 402.1 acres of induced development could occur from the proposed 2nd Access Project, of which an estimated 32.6 acres would impact estuarine wetlands.

Reasonably foreseeable future actions include planned roadway projects and developments planned and platted within the RSA. Planned roadways account for approximately 46.5 acres with 2.8 acres impacted estuarine wetlands. Future subdivisions account for another approximately 94.7 acres of the RSA, with an estimated 47.8 acres of impacts to estuarine wetlands. An additional 397.0 acres of induced development could occur as a result full build-out of the other CCRMA roadway projects, with an estimated 200.5 acres of impact to estuarine wetlands. Total estimated impacts to estuarine wetlands from reasonable foreseeable future actions are 251.0 acres.

An estimated 46,918.1 acres of land, encompassing approximately 21,599.7 acres of estuarine wetlands, is proposed for acquisition for the LANWR (USFWS 1999).[7] However, project-induced development could increase local land competition and drive up the price of land, making it increasingly unavailable for the USFWS to purchase, reducing the amount of actual land acquisition.

Refer to **Table 6-18** for a summary of the potential cumulative effect area within the RSA.

[7] Estimate based on a geographic information system analysis of Expansion Plan information, geographic information system city limits data, and 2nd Access Proposed ROW. Area within city limits/extraterritorial jurisdictions and 2nd Access Proposed ROW were subtracted from mapped acquisition area.

Table 6-18: Potential Cumulative Effect within the Estuarine Wetland RSA

Type of Action	Past/Present Actions*	Current Action**	Reasonably*** Foreseeable Actions	Cumulative Effect***
Development	3,574.7 acres of development in 1977 5,065.5 acres of development in 2008 1906.1 acres currently under development in subdivisions . Total development = 6,971.6 acres 283.6 acres impacted between 1994 and 2008 approximately 962.0 acres potentially impacted from current development 46.3 acres within existing road ROWs Total impacts to estuarine wetlands = 1,291.9 acres	Max. 19.8 acres estuarine wetland. Indirect Impact – estimated 32.6 acres induced development in estuarine wetlands Total impacts to estuarine wetlands from current action = 52.4 acres	Approx. 94.7 acres of subdivisions Approx. 397.0 acres induced development from other CCRMA projects Approx. 46.5 acres of roads Total Reasonably Foreseeable Actions = 538.2 acres approximately 47.8 acres from future subdivisions approximately 200.5 acres from induced development of other CCRMA projects 2.8 acres from other roadway projects) Total impacts to estuarine wetlands = approximately 491.7 acres (0.2 percent of the developable RSA	Total impacts to estuarine wetlands = 1,548.9 acres
Conservation	73,456.4 acres of parks, refuge and other water quality protection land	-	Potential for addition of 46,918.1 acres to LANWR	120,374.5 acres of parks, refuge and other water quality protection land (54,984.7 acres wetlands)
Ratio (D:C)***	-	-	-	1:35.5 (wetlands)

Sources: HNTB (2009)
* Assumes that subdivisions currently being developed will continue to develop prior to the letting date of the 2nd Access Project.
**Incorporates highest potential direct impact.
***Ratio of Development acreage to Conservation acreage

6.3.4.7 Step 7: Results – Estuarine Wetlands

The threats to wetland loss were reviewed to understand the potential cumulative effects to estuarine wetlands in the RSA. Potential cumulative effects to which the current action could contribute include direct conversion of wetland and threats to wetland water quality from increased sediments and contaminants found in stormwater runoff or hazardous material spills originating from the roadway.

Development pressure would be the most likely cause of wetland loss within the estuarine wetland RSA. Approximately 3.4 percent of the estuarine wetland RSA has already developed in the past or is planned for development in the foreseeable future (including the current action).

However, as stated in **Section 6.3.3.3**, historic loss of coastal wetlands in Cameron County is considered minimal compared with the wetland loss in other Texas coastal counties (Moulton, et al. 1997). Moreover, numerous wetland conservation measures exist (Step 6, Step 8). Lastly, while an estimated 33,454.6 acres of estuarine wetland areas are potentially developable, a high proportion exists within the 100-year floodplain.

Regulatory controls are an important component of assuring that future impacts to wetlands are minimized. Waters of the U.S. are regulated by the USACE under authority of Section 404 of the Clean Water Act. Section 404 of the Clean Water Act authorizes the USACE to issue permits for the discharge of dredged or fill material into waters of the U.S., including wetlands. The intent of this law is to protect the nation's waters from the indiscriminate discharge of material capable of causing pollution, and to restore and maintain their chemical, physical and biological integrity. Any discharge into waters of the U.S. must be in accordance with Section 404(b)(1) guidelines developed by the EPA in conjunction with the USACE. In the Section 404 permit process, permit applications are reviewed by the USACE for compliance with Section 401 of the Clean Water Act. Section 401 water quality certification is administered by the TCEQ.

In summary, the proposed project's impact to wetlands would be avoided or minimized by compliance with the USACE nationwide and individual permit programs, and with TCEQ water quality certification. The proposed project's impact to estuarine wetlands would be minimized by design undertaken in consultation with the USFWS and TPWD and by compliance with federal and state laws. As a result, the proposed project would not substantially contribute to significant cumulative impacts to wetlands. The cumulative impact of reasonably foreseeable future actions to waters of the U.S. within the RSA could be minimized by adherence to applicable USACE and TCEQ regulations for projects subject to state and federal jurisdiction. Finally, because of the success of no net loss policies and the abundance of preservation lands in the RSA, the cumulative effect of development is expected to retain a large proportion of estuarine wetlands in the RSA.

6.3.4.8 Step 8: Mitigation – Estuarine Wetlands

It is anticipated that the current development trend would continue as the region continues to grow. However, if development rates increase in intensity, wetland loss could occur over time. Thus, it becomes more crucial that wetland loss protections are strengthened where needed, fully implemented and consistently enforced.

It is impossible to discuss loss of wetlands in the region without addressing mitigation measures and the foresight of local planners to mitigate wetland loss. Above in Step 3 and Step 6 are descriptions of mitigative and regulatory measures implemented by local jurisdictions as well as a summary of USACE requirements.

In addition, a number of initiatives have been undertaken within the RSA, which include conservation of wetland wildlife habitats, most notably the establishment of LANWR. An example of a private-public initiative serving to protect estuarine wetlands in the Laguna Madre is the Nature Conservancy's *Conservation Plan for the Texas Portion of the Laguna Madre* which evaluates conservation needs for Laguna Madre wildlife habitats including salt flats, mud flats and intertidal marshes.

Reliance on regulatory programs to ensure future environmental protection does not provide complete protection of the regulated resource. Regulations are subject to violation, and not all losses of waters of the U.S. would be permitted or reported and not all violations would be discovered and pursued by regulatory agencies. There is a high likelihood that minor regulatory infractions would occur in some of the approximately 11,238.3 acres of developable land[8] in the RSA, resulting in limited unpermitted and unmitigated impacts to waters of the U.S., including wetlands. Those which are compliant with the NWP are anticipated to have minor impacts. Those which are non-compliant may result in unmitigated loss of wetland habitat. It is impossible to predict how large those impacts would be, but development in the RSA would undoubtedly result in some loss of wetlands.

It is important to stress with regard to this project that all impacts to jurisdictional waters associated with this project would be mitigated in compliance with all applicable regulatory standards. The CCRMA would coordinate the project with USACE, USFWS and TCEQ by sending copies of the South Padre Island Proposed 2nd Access Project draft environmental impact statement and final environmental impact statement documents for their review and comments regarding wetland impacts.

6.3.5 Threatened and Endangered Species and State–Listed Rare Species - Mainland

6.3.5.1 Step 1: Resource Identification - Threatened and Endangered Species and State –Listed Rare Species - Mainland

The following species are found in rangeland, thornscrub, freshwater and estuarine wetland and aquatic habitats of the mainland. These include 11 birds, seven mammals, five plants, five reptiles, four amphibians, two insects, one fish species, one insect, and one mollusk species (**Table 6-19**).

[8] Land not protected from development, not currently in a subdivision, and not in the 100-year floodplain.

Table 6-19: Threatened and Endangered Species and State–Listed Rare Species in the RSA

Federal/State Threatened and Endangered Species	State –Listed Rare Species
Sheep frog	Lila de los llanos
White-lipped frog	Plains gumweed
Black spotted newt	Shinners' rocket
South Texas siren – large form	Bailey's ball moss
Texas Botteri Sparrow	Western Burrowing Owl
Gray Hawk	Brownsville Common Yellowthroat
White-tailed Hawk	A Royal moth
Southern yellow bat	Manfreda giant-skipper
Coues' rice rat	Sennett's Hooded Oriole
Texas scarlet snake	Audubon's Oriole
Black-striped snake	American eel
Indigo snake	Mexican long-tongued bat
Texas tortoise	Ghost-faced bat
Speckled racer	Plains spotted skunk
Texas horned lizard	Salina mucket
Northern Aplomado Falcon	Tamaulipan agapema
Gulf Coast jaguarundi	
Ocelot	
South Texas ambrosia	
American Peregrine Falcon	
Piping Plover	
Northern Beardless-tyrannulet	

Source: TPWD (2009); USFWS (2009)

Areas of dense thorn-scrub brush, rangeland and wetland are scattered throughout the RSA, often isolated from other such habitats through fragmentation due to development or farmland conversion.

Thorn-scrub brush community and riparian corridors, including those associated with irrigation canals, provides crucial habitat for listed species and rare species including Tamaulipan agapema, Bailey's ball moss, Brownsville Common Yellowthroat, royal moth, Manfreda giant-skipper, Audubon's Oriole, American eel, Mexican long-tongued bat, ghost-faced bat, salina mucket, blackspotted newt, South Texas siren, Gray Hawk, American Peregrine Falcon, Northern Aplomado Falcon, gulf coast jaguarundi, ocelot, South Texas ambrosia and several listed reptiles. Rangeland grassland habitat provides crucial habitat for listed species and rare species including Lila de los llanos, Shinner's rocket, Western Burrowing Owl, plains spotted skunk, sheep frog, white-lipped frog, Texas Botteri's Sparrow and White-tailed Hawk. Lastly, wetland habitats, which are scattered in the western portion of the RSA and more extensive in the eastern portion of the RSA, provide habitat for shorebirds, amphibians and aquatic species.

As development continues throughout the Lower Rio Grande Valley, these habitats become increasingly scarce and fragmented, potentially impacting listed species and rare species in the region. The importance of conservation efforts to facilitate recovery and conservation of these species, as expressed in the federal and state legislation, make analysis necessary.

6.3.5.2 Step 2: RSA – Threatened and Endangered Species and Species of Concern - Mainland

The RSA for mainland threatened and endangered species is shown in **Exhibit 6-5** and corresponds to the mainland portion of the freshwater wetlands RSA. The RSA for mainland threatened and endangered species encompasses approximately 497,947 acres, of which approximately 140,593 acres are suitable habitat for mainland threatened or endangered species. Areas of suitable habitat for ocelot/jaguarundi and Northern Aplomado Falcon (**Exhibit 6-5**) are within the mainland RSA are also discussed.

6.3.5.3 Step 3: Resource Health and Historical Context – Threatened and Endangered Species and State–Listed Rare Species- Mainland

According to TPWD (2005), Cameron County has more threatened and endangered species than any other Texas County. This is the result of extensive native habitat loss combined with the RSA's location at the northern extent of numerous subtropical species with ranges extending into Mexico (**Chapter 4**). Most thorn-scrub brush, rangeland, wetland and aquatic habitats have been converted to farmland and developed uses.

During the latter half of the nineteenth century, Cameron County's economy was based largely on ranching. Irrigation was introduced on a small scale during the 1880s. With the opening of the railroad in 1904, the area was opened for an extensive, ongoing influx of settlers seeking to farm. Between 1920 and 1930 the number of farms in Cameron County grew from 1,507 to 2,936, and by 1940 there were 3,243 farms in the county. Settlers cleared the land of brush, extended the irrigation system, built new roads, introduced large-scale truck farming and established commercial citrus orchards, which became one of the leading industries in the region. By the early 1990s, more than 80.0 percent of Cameron County was in farms and ranches (Garza and Long 2009).

As a result, an estimated 95.0 percent of native habitat has been removed from the Lower Rio Grande Valley (USFWS 2009). Habitat in Brownsville is currently being lost at a rate of approximately 2.5 percent annually. If that trend continues, it is estimated that 50.0 percent of the habitat area in the Brownsville extraterritorial jurisdiction will be lost in the next 20 years (City of Brownsville 2009).

Based on examination of 1977 and 2008 aerial photography, an estimated 24,901.5 acres of the mainland threatened and endangered species RSA were developed in 1977 and approximately 68,434.7 acres were developed in 2008. This development impacted approximately 2,730.3 acres of threatened and endangered species habitat. A total of 640 subdivisions totaling approximately 24,678.1 acres are currently under development, of which approximately 12,123.0 acres may impact threatened and endangered species habitat. Therefore, approximately 93,112.8 acres of the mainland threatened and endangered species RSA is currently developed or under development. Additionally, 118,637.9 acres are currently preserved or designated critical habitat. Therefore, 286,196.3 acres of the RSA are available for development. Examination of aerial photography identifies approximately 140,593 acres of unprotected (i.e., developable) remaining shrub/scrub, rangeland and wetland habitat (i.e., threatened and endangered species habitat) in the RSA.

Numerous conservation areas have been established in recognition that historic removal of native vegetation through cattle ranching and agriculture and more recent removal for development have left a number of species in danger of extinction or extirpation. The largest

collection of conservation lands are owned by the USFWS. These are Santa Ana, Laguna Atascosa and Lower Rio Grande Valley National Wildlife Refuges, established in 1943, 1946 and 1979, respectively. Critical habitat for the Piping Plover has been designated throughout the gulf states including 10,923.3 acres in the RSA, along the Laguna Madre; 5,960.7 acres are located within LANWR while the remaining 4,962.6 acres occur outside the refuge. In addition, State of Texas-owned Las Palomas Wildlife Management Area was established in Cameron County in 1985. Altogether, these federal and state owned conservation holdings total over 116,000 acres in Cameron County. Private conservation initiatives include the 1,034-acre Nature Conservancy Lennox Foundation Southmost Preserve and 640-acre Sabal Palm Sanctuary owned and operated by the Audubon Society. 1,200 types of plants, 700 species of vertebrates and 300 kinds of butterflies occur in the remaining conservation lands (USFWS 2009).

These conservation areas are engaged in preservation and restoration of natural habitats, including brushland, rangeland and aquatic and wetland habitats. Various management techniques are used to promote growth of natural vegetation and enhancement of habitats for listed species and conservation of rare vegetation series.

In addition, the USFWS is attempting to provide a connection between the National Wildlife Refuge units located in the northeast and southeast portions of the RSA, in the vicinity of the proposed 2nd Access Project alternatives. This connection would provide a wildlife corridor for the endangered ocelot and other wildlife. Similarly, the designation of Lower Rio Grande Valley National Wildlife Refuge was intended for connecting isolated habitats along the lower 275 miles of the Rio Grande (USFWS 2009).

Habitat impacts and countervailing conservation efforts in the RSA are extensive. Because the TxDOT guidance on cumulative impacts analysis requires the NEPA practitioner to evaluate resources that are in poor or declining health or at risk (even if project impacts are minor), cumulative impacts to mainland threatened and endangered species and rare species will be evaluated further.

Northern Aplomado Falcon

The Northern Aplomado Falcon inhabits savannas, open woodlands, grassy plains and valleys with scattered mesquite, yucca and cacti, nesting in old stick nests of other bird species. As with other listed and rare species in the RSA, most of these habitats have been converted to farmland and developed uses. An estimated 95.0 percent of native habitats have been removed from the Lower Rio Grande Valley (USFWS 2009). Examination of aerial photography identifies approximately 44,467 acres of unprotected remaining unimproved rangeland/grassland habitat in the RSA.

The Cameron County national wildlife refuges provide the most remaining falcon habitat in the RSA. There have also been extensive, successful efforts to reintroduce the Northern Aplomado Falcon into LANWR. The SPI 2nd Access Project has potential for direct adverse effect to this species (**Chapter 4**). As a result, cumulative impacts to the Northern Aplomado Falcon will be evaluated further.

Ocelot and Jaguarundi

The ocelot and jaguarundi inhabit thick brush lands, chaparral thickets, mesquite scrub and live oak mottes, most of which has been lost to farmland conversion. Examination of aerial photography identifies approximately 70,418 acres of unprotected remaining thorn-scrub/shrub and forest in the RSA.

There are currently 13 known ocelots on the LANWR (Sternberg and Mays 2011). Several sightings of the jaguarundi occurred most recently during the fall of 2004 and early 2005. The SPI 2nd Access Project (all build alternatives) has potential for direct adverse effect to these species (**Chapter 4**). As a result, cumulative impacts to the ocelot and jaguarundi will be evaluated further.

6.3.5.4 Step 4: Direct and Indirect Impacts – Threatened and Endangered Species and State–Listed Rare Species- Mainland

The proposed project would have direct impacts, ranging from 145.9 to 309.3 acres (0.1 to 0.2 percent) to potential thorn-scrub brush, riparian, rangeland and freshwater wetland habitat for threatened and endangered species and rare species in the RSA, depending on the build alternative and acreage affected by underground utility relocation outside the proposed 2nd Access ROW, if required (**Table 6-20**).

Table 6-20: Direct Habitat Impacts By Alternative within the RSA

Alternative	Wetlands* (acres)	Thorn-scrub Brush, Riparian, Rangeland, Fence Line	Total (acres)
1	6.3	174.2	180.5
2	38.1	217.4	255.5
3	35.3	274.0	309.3
4	6.2	180.7	186.9
5	38.1	223.8	261.9
6	12.1	291.8	303.9
7	22.3	227.7	250
8	6.2	139.7	145.9
9	6.0	175.3	181.3
10	12.1	251.5	263.1
11	22.3	187.4	209.7

Source: HNTB (2009)
*Freshwater wetland

Northern Aplomado Falcon

The proposed project would have direct impacts, ranging from 135.5 to 248.1 acres (0.3 to 0.6 percent) to habitat of the Northern Aplomado Falcon, depending on the build alternative and acreage affected by underground utility relocation outside the proposed 2nd Access ROW, if required (**Table 6-21**).

Table 6-21: Direct Northern Aplomado Falcon Habitat Impacts By Alternative within the RSA

Alternative	Northern Aplomado Falcon Habitat (acres)
1	240.4
2	168.6
3	234.0
4	240.4
5	168.6
6	248.1
7	135.5
8	240.4
9	168.6
10	248.0
11	135.5

According to *Proposed South Padre Island Second Access Project Economic Analysis*, an estimated 162.3 acres of induced development could occur on the mainland by 2045 as a result of the proposed 2nd Access Project above the No-Build Alternative (TXP, Inc. 2009), potentially all suitable for the Northern Aplomado Falcon. Complete removal of habitat from induced development would be considered a worst-case scenario, as direct impacts to listed species are prohibited under current regulations.

Ocelot and Jaguarundi

The proposed project would have direct impacts, ranging from 4.8 to 119.3 acres (0.01 to 0.2 percent) to potential thorn-scrub brush, potential habitat for ocelot and jaguarundi, depending on the build alternative and habitat acreage affected by underground utility relocation outside the proposed 2nd Access ROW, if required (**Table 6-22**). Moreover, soils series that would support thorn-scrub brush restoration efforts (Harveson *et. al.*[9]) are prevalent in all alternative proposed ROWs.

Table 6-22: Direct Ocelot/Jaguarundi Habitat Impacts By Alternative within the RSA

Alternative	Ocelot and Jaguarundi Habitat (acres)
1	14.5
2	4.8
3	69.8
4	14.6
5	4.8
6	107.8
7	32.0
8	13.6
9	4.8
10	119.3
11	32.0

According to *Proposed South Padre Island Second Access Project Economic Analysis*, an estimated 162.3 acres of induced development could occur on the mainland by 2045 as a result of the proposed 2nd Access Project above the No-Build Alternative (TXP, Inc. 2009), which could potentially impact approximately 33.5 acres of ocelot and jaguarundi habitat.

6.3.5.5 Step 5: Reasonably Foreseeable Actions – Threatened and Endangered Species and State–Listed Rare Species – Mainland

A total of 1,515 subdivisions totaling approximately 45,697.4 acres (9.2 percent of the RSA) have been platted, with an average lot size of approximately 0.58 acres. Of these, 162 subdivisions totaling approximately 5,114.5 acres are slotted for future development (all parcels and platted lots vacant). Subdivision information for the RSA is listed in **Table 6-23**.

[9] Harveson, Patricia M., M.E. Tewes, G.L. Anderson, and L.L. Laack. *Hbitat use by ocelots in south Texas: implications for restoration*. Wildlife Society Bulletin 2004, 32(3):948-954

Table 6-23: Subdivisions in the Threatened and Endangered Species and State–Listed Rare Species - Mainland RSA

Subdivision Name	No. of Lots	Acreage
SANTA ISABEL GRANT	9	6271.5
EL JARDIN RESUBDIVISION	319	2873.2
ESPIRITU SANTO IRRGTD LAND C0 SUBD	188	1650.8
BARREDA GARDENS SUBDIVISION	181	1610.3
SAN BENITO LAND & WATER CO SUBD	294	1463.4
MONTE GRANDE SUBDIVISION 1	59	1380.4
BAY VIEW PARK ADDITION	194	1306.7
W F HULL SUBDIVISION	47	872.6
DELTA FARMS SUBDIVISION	30	844.4
EL JARDIN SUBDIVISION SHARE 19/27	82	753.5
LAGUNA VISTA CLUB/TOWNESITE	22	750.2
SANTA ISABEL GRANT PORT ISABEL	81	687.7
ESPIRITU SANTO GRANT SHARE 22	82	679.0
EL JARDIN SUBDIVISION SHARE 19/27	423	674.0
BROWNSVILLE LAND & IMP CO SUBD	344	629.3
SAN BENITO LAND & WATER CO SUBD	51	620.4
ESPIRITU SANTO GRANT SHARE 19	89	448.4
AMIGOLAND SUBD SEC II UNIT C	24	423.9
J C BENNETT SUBDIVISION	12	391.0
EL JARDIN SUBDIVISION SHARE 19	389	384.9
R A LIECK SUBDIVISION	21	370.3
BROWNSVILLE ORIGINAL TOWNSITE	1879	314.3
LON C HILL SUBDIVISION	64	305.1
PADRE ISABEL ESTATES SUBDIVISION	2170	259.9
BAYVIEW CITRUS GROVES U-3 SEC-8	64	257.6
CHICAGO GARDENS SUBDIVISION	121	232.4
LOS FRESNOS ORIGINAL TOWNSITE	915	195.3
ROSE RESUB	40	188.8
RESACA FRONT SUBDIVISION	34	182.0
PORT ISABEL ORIGINAL TOWNSITE	919	178.8
LOS EBANOS PROPERTIES SUBDIVISION	148	176.4
BAYVIEW CITRUS GROVES U-4 SEC-2	18	171.9
LAGUNA VISTA ORIGINAL TOWNSITE	412	169.8
EAST BROWNSVILLE ADDITION	1026	157.7
MEDIA LUNA ADDITION	76	153.7
WEST BROWNSVILLE ADDITION	646	149.4
EMILIA SUBDIVISION	41	143.7
MAGIC VALLEY RESUBDIVISION	14	141.3
FRESNOS LAND & IRRG CO SUBDIVISION	9	138.7
BROWNELL SUBDIVISION	49	133.9
RIO HONDO ORIGINAL TOWNSITE	411	130.0
LAS LAGUNAS SUBDIVISION	17	123.8
LAND O'LAKE SUBDIVISION BLKS 1-11	216	122.8
J S DUNCAN SUBDIVISION	14	122.8
ESPIRITU SANTO GRANT SHARE 12	0	121.5

Subdivision Name	No. of Lots	Acreage
EL JARDIN SUBDIVISION SHARE 19	59	121.1
OLMITO GARDENS SUBD TRACT 1	39	120.2
CUNNINGHAM'S SUBD SAN BENITO	17	116.9
BAYVIEW CITRUS GROVES U-3 SEC-5	6	115.2
RANCHO VIEJO SUBD SECTION X	47	114.2
JARDIN TERRACE SUBDIVISION	47	112.9
RANCHO VIEJO ESPIRITU SANTO SHRE 1	13	112.1
BAYVIEW CITRUS GROVES U-4 SEC-3	6	108.5
GARDEN PARK SUBDIVISION	483	106.9
BROWNSVILLE LAND AND IMPROVEMENT	4	104.0
ACACIA LAKE TRACT SUBDIVISION	29	102.3
BROWNSVILLE CNTRY CLUB SUBD	0	101.8
CHAMPION SUBDIVISION	16	101.1
HIGHWAY SUBDIVISION	14	99.4
CLARA BENNETT SUBDIVISION	12	98.6
STILLMAN EXTENTION BROWNSVILLE	447	93.0
SAN BENITO THIRD ADDITION	353	91.8
PALO ALTO SUBDIVISION	7	90.1
BAYVIEW CITRUS GROVES U-3 SEC-7	29	89.0
LA POSADA SOUTH SUBD SEC III	597	88.3
EL JARDIN SUBDIVISION SHARE 32	3	86.9
RIO VIEJO SUBDIVISION	163	85.3
VILLA DEL NORTE SUBDIVISION	149	80.9
BISHOP-RICE-TAYLOR SUBDIVISION	41	79.7
THE ACADEMY SUBDIVISION PHASE I	5	78.7
BROWNSVILLE CNTRY CLUB SUBD SEC 3	259	76.7
SAN ROMAN TOWNSITE	7	76.7
COUNTRY CLUB ESTATES AT VICC	263	76.3
HARRIS GENTRY SUBDIVISION SEC-3	4	75.7
LAND O'LAKE SUBD BLKS C & H	186	75.0
ABELARDO ESTATES SUBDIVISION	28	74.7
TREASURE HILLS SUBDIVISION 5	107	74.6
PAREDES TRACT ADDITION	543	73.3
MOOSE LAKE VILLAGE SUBDIVISION	83	73.2
BAYVIEW CITRUS GROVES U-3 SEC-6	22	73.0
RESACA ESCONDIDA SUBDIVISION	36	72.8
LOZANO BANCO 122	0	72.8
SAN BENITO ORIGINAL TOWNSITE	349	70.9
EBONY HEIGHTS SUBDIVISION	452	68.5
CHICAGO GARDENS SUBDIVISION	94	67.9
SAN BENITO BUSINESS PARK SUBD I	14	67.8
HARBOR HEIGHTS SUBDIVISION 1	236	67.8
BAYVIEW CITRUS GROVES U-3 SEC-4	22	67.5
FRESNOS LAND AND IRRIGATION CO. SUBD	12	67.3
ACACIA LAKE GARDENS SUBDIVISION	177	66.4
GREEN VALLEY ESTATES SUBDIVISION	88	66.1
LOS EBANOS SUBDIVISION	199	63.7

Subdivision Name	No. of Lots	Acreage
COLONIA VICTORIA SUBDIVISION	519	63.2
COLONIA ACACIA SUBDIVISION	464	63.1
ARROYO ESTATES SUBDIVISION	139	62.5
FRESNOS LAND AND IRRIGATION CO. SUBD	12	61.6
BAYVIEW CITRUS GROVES U-4 SEC-4	11	59.8
BAYVIEW CITRUS GROVES U-4 SEC-5	2	59.7
GARCIA BAYFRONT SUBDIVISION	13	58.7
FRENCH RIVER VALLEY SECTION I	240	58.2
BROWNELL TRACT ADDITION	70	57.3
TREVINO-CANALES BANCO NO 5	3	56.7
RANCHO VIEJO SUBD SECTION II	89	54.2
PASTO VERDE SUBDIVISION	206	53.9
RANCHO VIEJO SUBD SECTION XI	129	53.7
BROWNSVILLE CNTRY CLUB SUBD SEC 6	321	52.8
BOULEVARD HEIGHTS ADDITION	331	51.9
BAYVIEW CITRUS GROVES U-4 SEC-10	7	50.8
SUBDIVISIONS > 50 ACRES (108)	20,567	34,343.2
ALL SUBDIVISIONS < 50 ACRES (1,407)	35,567	11,354.1
TOTAL SUBDIVISIONS (1,515)	56,134	45,697.3

Source: Cameron County Appraisal District (2009)

Proposed roadway projects for the RSA are identical to those for the surface water quality RSA (**Table 6-9, Section 6.3.2.5**). To summarize, approximately 45 roadway improvement projects are foreseeable in the RSA. An estimated 1,025 acres of potential habitat (thorn-scrub brush, rangeland, wetland and aquatic) are encompassed within proposed ROWs for these projects. **Table 6-9** (**Section 6.3.2.5**) lists proposed transportation projects, excluding the proposed project, and associated ROW acreages.

According to *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009), an additional 174.4 acres of induced development on the mainland beyond that induced by the proposed 2nd Access Project could occur by 2045, as a result of full build-out of the other CCRMA roadway projects. It should be noted this projection for induced development only accounts for the effect of CCRMA Plan roadways. Additional induced development in the RSA could result from full build-out of Brownsville and Harlingen-San Benito Metropolitan Planning Organization and TxDOT Surface Transportation Improvement Plan Project roadways as listed in **Table 6-9** (**Section 6.3.2.5**).

The LANWR Proposed Refuge Expansion Plan (USFWS 1999) includes plans to acquire an additional approximately 99,281.8 acres within the RSA (19.9 percent of the RSA).[10] Properties planned for acquisition include those with potential habitat, including thorn-scrub brush habitat, rangelands, and wetlands. Full expansion of the refuge would decrease the lands available for future development.

[10] Estimate based on a geographic information system analysis of Expansion Plan information, geographic information system city limits data, and 2nd Access Proposed ROW. Area within city limits/extraterritorial jurisdictions and 2nd Access Proposed ROW were subtracted from mapped acquisition area.

6.3.5.6 Step 6: Cumulative Impacts Assessment – Threatened and Endangered Species and State–Listed Rare Species - Mainland

In this step, cumulative impacts are identified and the magnitude of those effects is evaluated.

Development pressure and associated loss of habitat are the main threats to threatened and endangered species and rare species in the RSA; therefore, it is important to review relevant regulations related to development impacts to these resources within the RSA.

The Endangered Species Act of 1973 provided for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife and plants depend. The Act authorizes the determination and listing of species, prohibits unauthorized taking of endangered species, provides authority to acquire land for the conservation of listed species, encourages state-level programs for endangered and threatened wildlife and plant conservation, and authorizes criminal penalties for violating the Act.

In 1973, the Texas legislature authorized the TPWD to establish a list of endangered animals in the state. In 1988 the Texas legislature authorized the Department to establish a list of threatened and endangered plant species for the state. TPWD regulations prohibit the taking, possession, transportation or sale of any of the animal species designated by state law as endangered or threatened without the issuance of a permit. State laws and regulations prohibit commerce in threatened and endangered plants and the collection of listed plant species from public land without a permit issued by TPWD. Listing and recovery of endangered species in Texas is coordinated by the Wildlife Diversity Program.

In 1991, TPWD adopted state goals for protection of threatened and endangered species. These goals reflect the regulatory program of Endangered Species Act legislation that prohibits the taking of species unless authorized by a permit issued under Endangered Species Act.

Analysis of data for subdivisions, roadway information and aerial photo interpretation indicates that approximately 18.7 percent of the study area (93,112.8 acres) has already been fully developed or is currently being developed. The majority of this past development is roadway and low density, suburban residential land use. Another 22.8 percent (113,652.9 acres) of the land encompassing approximately 109,842.6 acres of thorn-scrub, rangeland, wetland and open water habitat was preserved either fee simple or through conservation easements as parks, preserves or conservation lands. These lands are almost entirely restricted from development. Another 4,985 acres have been designated critical habitat for the Piping Plover by the USFWS. While not a prohibition to development, a critical habitat designation necessitates consultation with the USFWS for any action with federal involvement such as funding or permitting (USFWS 2009). Therefore, approximately 286,196.3 acres within the RSA is available for development, of which approximately 140,593 acres (49.1 percent of the developable RSA) are suitable threatened or endangered species habitat.

The current action accounts for 164.8 to 247.6 acres of ROW with associated impacts to up to 291.9 acres of potential habitat, depending on the build alternative, within the RSA. In addition, a projected 162.3 acres of induced development impacts could occur within the RSA as a result of the proposed 2nd Access Project.

Reasonably foreseeable future actions include planned roadway projects and developments currently underway, as well as those planned and platted within the RSA. Planned roadways, full build-out of the other CCRMA roadway projects, and future subdivisions account for another

approximately 2,506.6 acres, 174.4 acres, and 5,114.5 acres respectively. An estimated 99,281.8 acres of land, encompassing approximately 56,207.2 acres of thorn-scrub, rangeland, wetland and open water habitat, as well as 4,408.3 acres of Piping Plover critical habitat, is proposed for acquisition for the LANWR (USFWS 1999).[11]

To summarize, 620 subdivisions totaling approximately 24,978.1 acres have been subdivided and are currently being developed. These areas encompass approximately 8,910.8 acres of thorn-scrub, rangeland, riparian and wetland habitat. An estimated 3,341.4 acres of these habitats also occur within roadway ROWs, 2,323.4 acres in existing ROW and an additional 1,018.0 acres in proposed roadway ROWs. A maximum of 291.9 acres of potential habitat could be impacted by the proposed 2nd Access Project. Potentially, induced development from the 2nd Access Project could impact approximately 162.3 acres of habitat on the mainland. An additional 174.4 acres of induced development, potentially all habitat, could occur within the RSA as a result from full build-out of other CCRMA Plan roadways.

Refer to **Table 6-24** for a summary of the potential cumulative effect area within the RSA.

[11] Estimate based on a geographic information system analysis of Expansion Plan information, geographic information system city limits data, and 2nd Access Proposed ROW. Area within city limits/extraterritorial jurisdictions and 2nd Access Proposed ROW were subtracted from mapped acquisition area.

Table 6-24: Potential Cumulative Effect within the Threatened and Endangered Species and State–Listed Rare Species - Mainland RSA

Type of Action	Past Actions*	Current Action**	Reasonably Foreseeable Actions	Cumulative Effect***
Development	24901.5 acres developed in 1977 68,434.7 acres developed in 2008 24,678.1 acres currently under development; 5086.4 acres of roads Impacts to T&E Species habitat between 1977 and 2008 = 2,730.3 acres Potential impact to T&E Species habitat from current development= 12,123.0 Total impacts to T&E Species habitat = 14,853.3 acres	Direct Impact – Max. 291.9 acres habitat Indirect Impact – approx. 163.2 acres of impact Total Impact to T&E Species Habitat = 454.2 acres (0.3 percent of total habitat)	5,114.5 acres of subdivisions Approx. 174.4 acres induced development from other CCRMA projects Approx. 2,506.6 acres of roads Estimated impact to T&E Species Habitat (based on 49.1 percent of developable RSA includes habitat) = 3,623.2 acres Total impact to mainland T&E Species RSA = 7,795.5 acres	Total Cumulative Impact = 18,930.7 acres habitat
Conservation	113,652.9 acres of parks, refuge and other conservation land	-	Potential for addition of 99,281.8 acres to LANWR	212,934.7 acres of parks, refuge and other conservation land (171,034.8 acres habitat****)
Ratio (D:C)***	-	-	-	1:9.0 (habitat)

Source: HNTB (2009)
* Assumes that subdivisions currently being developed will continue to develop prior to the letting date of the 2nd Access Project.
** Incorporates highest potential direct impact.
****thorn-scrub shrub, rangeland, wetland
*** Ratio of Development acreage to Conservation acreage

Northern Aplomado Falcon

An estimated 40 subdivisions totaling approximately 14,088 acres have been subdivided within potential falcon habitat in the RSA. An estimated 1,304 acres of potential habitat has been converted to roadway ROW. A maximum of 248.1 acres of potential falcon habitat could be impacted by the proposed 2nd Access Project depending upon the alternative. Potentially, development induced by the 2nd Access Project could impact approximately 162.3 acres of Northern Aplomado Falcon habitat. Approximately 27.0 acres from build-out of other CCRMA projects could be habitat. An estimated 73,028 acres of conservation lands, 52,695 acres within the LANWR, contain potentially suitable falcon habitat. Examination of aerial photography reveals an estimated 69,108 acres of potential falcon habitat proposed for future acquisition for

the LANWR[12]. It should be noted that these estimates are based on an examination of aerial photography which is not always an accurate indicator of actual habitat quality or characteristics. Nevertheless, examination of aerial photography provides a reasonable method of identifying potential habitat on a large scale. Where suitable habitat occurs, project-induced development could increase local land competition and drive up the price of land, making it increasingly unavailable for the USFWS to purchase, reducing the amount of actual land acquisition.

Refer to **Table 6-25** for a summary of the potential cumulative effect to Northern Aplomado Falcon habitat within the RSA.

Table 6-25: Potential Cumulative Effect to Northern Aplomado Falcon within the Threatened and Endangered Species and State–Listed Rare Species - Mainland RSA

Type of Action	Past Actions*	Current Action	Reasonably Foreseeable Actions	Cumulative Effect**
Development	24901.5 acres developed in 1977 68,434.7 acres developed in 2008 Impacts to habitat between 1977 and 2008 = Max. 2,730.3 acres 1,304 acres converted to roadways 24,678.1 acres currently under development (approx. 3,834.5 acres falcon habitat) Total impacts to Falcon habitat = 6,564.8 acres	Direct Impact – max. 248.1 acres habitat* Indirect Impact – approx.162.3 acres of induced development Total impact = approx. 410.4 acres	5,114.5 acres future subdivisions 2,506.6 acres future roads Approx. 174.4 acres induced development from other CCRMA projects Total = 7,795.5 acres Total potential impacts to falcon habitat = 1,846.8 acres	Total Cumulative Impact = 8,821.9 acres habitat
Conservation	73,028 acres of falcon habitat	-	Potential for addition of 69,108 acres of falcon habitat	142,136 acres habitat conservation
Ratio (D:C)***	-	-	-	1:16.1

Source: HNTB (2009)
* Assumes that subdivisions currently being developed will continue to develop prior to the letting date of the 2nd Access Project.
**Incorporates highest potential direct impact.
***Incorporates the mean of highest and lowest Current Action alternative proposed ROW (206.2 acres)

[12] Estimate based on a geographic information system analysis of Expansion Plan information, aerial photography, geographic information system city limits data, and 2nd Access Proposed ROW. Area within city limits/extraterritorial jurisdictions and 2nd Access Proposed ROW were subtracted from mapped acquisition area.

Ocelot and Jaguarundi

An estimated 10 subdivisions totaling approximately 7,158 acres have been subdivided within potential ocelot and jaguarundi habitat in the RSA. An estimated 1,025 acres of potential habitat has been converted to roadway ROW. A maximum of 242.7 acres of potential ocelot and jaguarundi habitat could be impacted by the proposed 2nd Access Project depending upon the alternative. Induced development from the 2nd Access Project could impact approximately 33.5 acres of suitable habitat for the ocelot and jaguarundi. In addition, because ocelot and jaguarundi habitat comprises approximately 24.6 percent of the developable RSA, then an estimated 42.9 acres from build-out of other CCRMA projects could be habitat.

An estimated 52,695 acres, some of which is habitat for ocelot and jaguarundi, occurs within the LANWR. Examination of aerial photography reveals an estimated 18,390 acres of potentially suitable habitat proposed for future acquisition for the LANWR[13]. However, these estimates are based on interpretation of aerial photography which is not always an accurate indicator of actual habitat quality or characteristics. Specifically, it is difficult, using aerial photography, to differentiate optimal ocelot habitat (>95% canopy cover) from sub-optimal habitat (75%-95% canopy cover). Nevertheless, examination of aerial photography remains the most viable means of of habitat identification on a large scale. This method was used to identify light brush (25%-75% canopy) and dense brush (>75% canopy).

Additionally, project-induced development could increase local land competition and drive up the price of land, making it increasingly unavailable for the USFWS to purchase, reducing the amount of actual land acquisition.

Refer to **Table 6-26** for a summary of the potential cumulative effect to ocelot/jaguarundi habitat within the RSA.

[13] Estimate based on a geographic information system analysis of Expansion Plan information, geographic information system city limits data, and 2nd Access Proposed ROW. Area within city limits/extraterritorial jurisdictions and 2nd Access Proposed ROW were subtracted from mapped acquisition area.

Table 6-26: Potential Cumulative Effect to Ocelot and Jaguarundi within the Threatened and Endangered Species and State–Listed Rare Species - Mainland RSA

Type of Action	Past Actions*	Current Action	Reasonably Foreseeable Actions	Cumulative Effect**
Development	24901.5 acres developed in 1977 68,434.7 acres developed in 2008 Impacts to habitat between 1977 and 2008 = Max. 2,730.3 acres 1,304 acres converted to roadways 24,678.1 acres currently under development (approx. 4,292.6 acres ocelot/habitat) Total impacts to ocelot/jaguarundi habitat = 7,022.9 acres	Direct Impact – Max 119.3 acres Indirect Impact – approx. 33.5 acres Total impact = approx. 152.8 acres	5,114.5 acres future subdivisions 2,506.6 acres future roads Approx. 174.4 acres induced development from other CCRMA projects Total = 7,795.5 acres Total potential impacts to ocelot/jaguarundi habitat = 1,945.0	Total Cumulative Impact = 9,120.6 acres habitat
Conservation	52,695 acres of ocelot habitat	-	Potential for addition of 18,390 acres of ocelot habitat	71,085 acres habitat conservation
Ratio (D:C)***	-	-	-	1:7.8

Source: HNTB (2009)
* Assumes that subdivisions currently being developed will continue to develop prior to the letting date of the 2nd Access Project.
**Incorporates highest potential direct impact.
***Incorporates the mean of highest and lowest Current Action alternative proposed ROW (206.2 acres)

6.3.5.7 Step 7: Results – Threatened and Endangered Species and Species of Concern – Mainland

The threats described in recovery plans and other conservation documents were reviewed to understand the potential cumulative effect on threatened and endangered species in the RSA. Potential cumulative effects to which the current action could contribute include effects to spatial arrangement and connectivity of habitat areas for ocelot and jaguarundi (Harwell and Siminski 1990). Habitat loss for terrestrial brush species such as the indigo snake and horned lizard could also occur. Potential health effects could occur to aquatic amphibians and wetland species from increased sediments and contaminants found in roadway stormwater runoff or hazardous material spills. Potential cumulative effects to which the current action could contribute also include effects to turtle seagrass habitat (NOAA Fisheries and USFWS 2002) and inducement of development leading to degradation of Laguna water quality and Piping

Plover nesting habitat impacts including development-related increases in nest predation (USFWS 1996).

Habitat conversion to developed uses would be the most likely cause of impacts to mainland threatened and endangered species and rare species in the RSA. Approximately 10.8 percent of the RSA has already developed in the past or is planned for development in the foreseeable future (including the current action).

Extensive conservation lands exist within the RSA, primarily within LANWR. While extensive lands potentially serving as habitat are proposed for acquisition by the refuge, much of the remaining suitable habitat is outside of the acquisition boundary. These lands are unprotected, and would therefore be subject to development. However, a high proportion of suitable habitat occurs within 100-year floodplains, limiting actual development potential.

The proposed project's impact to threatened and endangered species and rare species and their habitats would be minimized by design undertaken in consultation with the USFWS, TPWD and by compliance with federal and state laws. As a result, the proposed project would not substantially contribute to significant cumulative impacts to mainland threatened and endangered species and rare species habitat loss in the RSA.

The cumulative impact of reasonably foreseeable future actions to threatened and endangered species and rare species habitat within the RSA could be limited by floodplain development limitations and by adherence to applicable USFWS and TPWD regulations for projects subject to state and federal jurisdiction. It should be noted that development nevertheless occurs within floodplains. Numerous Cameron County colonias, many established in floodplain areas, are recipients of ongoing local, federal and state funding to upgrade deficient infrastructure such as water and wastewater services or roads.

For the above reasons, and because of the abundance of conservation lands in the RSA, the cumulative effect of mainland development is expected to be the retention of a large portion of mainland threatened and endangered species and rare species habitats in the RSA. It should be noted; however, that this does not assure recovery of these species. According to the USFWS, there are not enough conservation lands, either already in conservation status or available (pending funding) to recover the ocelot, jaguarundi, or Northern Aplomado Falcon at this time.

Northern Aplomado Falcon

The threats described in conservation documents were reviewed to understand the potential cumulative effect on the Northern Aplomado Falcon within the RSA. Since 1990, there has been significant habitat loss and fragmentation throughout the lower Rio Grande valley. Potential cumulative effects to which the current action could contribute include encroachment in brush habitat and loss of wetlands which provide breeding areas for avian prey (USFWS 1990), both direct effects of the proposed project. Potential cumulative effects to which the current action could contribute also include inducement of development with associated further loss of brush and wetland habitats. It should be noted that secondary lead poisoning is another threat in portions of the historical U.S. range (USFWS 1999).

Conservation lands within the RSA contain extensive amounts of falcon habitat, much within the 100-year floodplain (**Exhibit 6-5**). A high proportion of additional lands proposed for acquisition occur within 100-year floodplain. It should be noted that development nevertheless occurs in these areas. Numerous Cameron County colonias, many established in floodplain areas, are

recipients of ongoing local, federal and state funding to upgrade deficient infrastructure such as water and wastewater services or roads.

The proposed project's impact to the Northern Aplomado Falcon would be minimized by design undertaken in consultation with the USFWS, TPWD and by compliance with federal and state laws. As a result, the proposed project would not be expected to substantially contribute to significant cumulative impacts to the falcon within the RSA.

The cumulative impact of reasonably foreseeable future actions to the falcon within the RSA could be limited by floodplain development limitations and by adherence to applicable USFWS and TPWD regulations.

For the above reasons, and because of the abundance of conservation lands containing falcon habitat within the RSA, the cumulative effect of mainland development is expected to be the retention of a large portion of suitable habitat in the RSA. The potential for improved conservation of the falcon is good due to the extent of conservation lands with falcon habitat within the RSA; according to the Aplomado Falcon Recovery Plan (USFWS 1990), habitat structure of the LANWR is likely favorable for the falcon. It should be noted; however, that this does not assure recovery of this species. According to the USFWS, there are not enough conservation lands, either already in conservation status or available (pending funding) to recover the Northern Aplomado Falcon at this time.

Ocelot and Jaguarundi

The threats described in the USFWS Recovery Plan (USFWS 1990b) and other conservation documents were reviewed to understand the potential cumulative effect on the ocelot and (potentially) jaguarundi within the RSA. Potential cumulative effects to which the current action could contribute include effects to spatial arrangement and connectivity of habitat areas (Harwell and Siminski 1990). Potential cumulative effects to which the current action could contribute also include inducement of development with associated further loss of brush habitats and connectivity of habitat areas. According the recovery plan, habitat loss and fragmentation jeopardize the long term survival of the ocelot and jaguarundi. Moreover, loss of habitat adjacent to currently occupied habitat may result in the loss of corridors by formation of biological barriers. Soils series that support thorn-scrub brush habitats and areas that would support thorn-scrub brush restoration efforts (Harveson *et. al.*[14]) are prevalent in developing areas of southern and eastern mainland Cameron County.

According to the recovery plan (1990b), conservation of habitat at LANWR, where the largest known ocelot population exists, may be particularly important. The Ocelot Recovery Plan is currently being updated and expected to be available to the public in 2012. An ocelot survey conducted by the Refuge in 2010-2011 found only 13 resident ocelots within LANWR, down considerably from the 1990 estimates of 35 to 40 ocelots. Currently there is an estimate of less than 50 ocelots in the entire Rio Grande Valley which is down from 100 in the 1990 assessment. Road-based mortality is responsible for approximately 42% of mortality. Three documented ocelot mortalities occurred within or near the RSA in 2010-11; additional mortalities may go unreported. Insufficient adjacent habitat and limited travel corridors limit the potential for expansion of the population. Recovery of the species requires appropriate habitat conservation, increased habitat patch connectivity, and prudent mitigation planning (such as the provision of ocelot underpass structures ("wildlife crossings") (see Chapter 7, Section 7.8). The existing

[14] Harveson, Patricia M., M.E. Tewes, G.L. Anderson, and L.L. Laack. *Hbitat use by ocelots in south Texas: implications for restoration*. Wildlife Society Bulletin 2004, 32(3):948-954

ocelot/jaguarundi habitat landscape is fragmented, with isolated conservation areas lacking adequate interconnectivity spread out over a four-county area. Further isolation of U.S. and Mexican ocelot/jaguarundi populations is caused by development along the border including proposed international bridge and border security projects. According to the Recovery Plan, remaining potential habitat was at imminent risk of clearing and development in 1990; much of this has been subsequently cleared. Also according to the recovery plan, conservation of ocelot and jaguarundi habitat along the lower Rio Grande corridor requires conservation of at least 100,000 acres of habitat. The Lower Rio Grande Valley National Wildlife Refuge currently contains approximately 37,090 acres within the RSA, mostly located along the Rio Grande in southeast Cameron County.

Extensive conservation lands containing ocelot and jaguarundi habitat exist within the RSA, primarily within LANWR. Moreover, extensive lands potentially serving as habitat are proposed for acquisition by the refuge. It should be noted that lands proposed for acquisition are currently unprotected, and would therefore be subject to development. While a high proportion of these occur within 100-year floodplains, development, as noted previously, nevertheless occurs in these areas.

The proposed project's impact to the ocelot (and potentially jaguarundi) would be minimized by design undertaken in consultation with the USFWS, TPWD and by compliance with federal and state laws. As a result, the proposed project would not be expected to substantially contribute to significant cumulative impacts to the ocelot within the RSA.

The cumulative impact of reasonably foreseeable future actions to the ocelot and jaguarundi within the RSA could be limited by floodplain development limitations and by adherence to applicable USFWS and TPWD regulations.

For the above reasons, and because of the abundance of conservation lands containing potential ocelot and jaguarundi habitat within the RSA, the cumulative effect of mainland development is expected to be the retention of a large portion of suitable habitat in the RSA. It should be noted; however, that this does not assure recovery of this species. According to the USFWS, there are not enough conservation lands, either already in conservation status or available (pending funding) to recover the ocelot or jaguarundi at this time.

6.3.5.8 Step 8: Mitigation – Threatened and Endangered Species - Mainland

It is anticipated that this development trend would continue as the region continues to grow. However, if development rates increase in intensity, habitat loss for mainland threatened and endangered species and rare species could occur over time. Thus, it becomes more crucial that habitat loss protections are strengthened where needed, fully implemented, and consistently enforced.

It is impossible to discuss thorn-scrub brush, rangeland, wetland and aquatic habitat loss on the mainland without addressing mitigation measures and the foresight of agencies and conservation groups to mitigate these losses. Above in Step 6 are descriptions of agency regulatory measures implemented throughout the RSA.

In addition, a number of initiatives have been undertaken within the RSA to conserve habitats for threatened and endangered species and rare species. These include establishment of three national wildlife refuges (Laguna Atascosa, Santa Ana, Lower Rio Grande Valley), two state wildlife management areas (Las Palomas, Arroyo Colorado), two state parks (Boca Chica,

Resaca de la Palma) Sabal Palm Audubon Sanctuary (Audubon Society) and Lennox Foundation Southmost Preserve (Nature Conservancy).

An example of ongoing government-sponsored conservation effort in the RSA includes 2009 funding for acquisition of 1,242 acres of resaca thorn-scrub habitat, awarded to the Nature Conservancy under the USFWS Endangered Species Conservation Fund Grant Program. Species anticipated to benefit from this conservation effort include ocelot, jaguarundi, Northern Aplomado Falcon and several state-listed species. The acquisition is intended to protect the existing species travel corridors and create a new opportunity of species dispersal (Newspaper Tree 2009).

An example of local interest in habitat preservation is identification of underutilization and mismanagement of urban resacas in the City of Brownsville's Comprehensive Plan (2009). The Plan cites lack of awareness regarding the importance of these areas for ecological function and eco-tourism.

The USFWS has authority over actions affecting threatened and endangered species and may require restoration, creation, enhancement or preservation of habitat features as compensation to offset unavoidable adverse impacts to the species. This means of compensatory mitigation is intended to comply with the general goals of the Endangered Species Act and the specific goal of de-listing.

Reliance on regulatory programs to ensure future environmental protection does not provide complete protection of the regulated resource. Regulations are subject to violation, and not all losses of threatened and endangered species and rare species would be permitted or reported and not all violations would be discovered and pursued. There is some likelihood that take would occur in some of the approximately 255,070 acres of developable land in the RSA (not in the 100-year floodplain). Impacts to potential habitats where no species occurrence is recorded need not be reported to the USFWS, so some loss of habitat is possible. Impacts which are compliant with the Endangered Species Act are anticipated to be minor.

It is important to stress with regard to this project that CCRMA has been in ongoing consultation with the USFWS and TPWD throughout project development, and would coordinate the project with these agencies by sending them copies of the South Padre Island Proposed 2nd Access Project draft environmental impact statement and final environmental impact statement documents for their review and comments. In addition, a Biological Evaluation (BE) would be prepared for consultation with the USFWS, TPWD, the National Marine Fisheries Service (NMFS), and Texas General Land Office (GLO). Wherever applicable, the determination of the appropriateness of mitigation and development of specific mitigation efforts would occur in coordination with TPWD, USFWS, CCRMA, TxDOT, and the USACE.

Northern Aplomado Falcon

It is anticipated that this development trend would continue as the region continues to grow. However, if development rates increase in intensity, habitat loss for the Northern Aplomado Falcon could occur over time. No critical habitat has been established for this species. Thus, it becomes more crucial that habitat loss protections are strengthened where needed, fully implemented, and consistently enforced.

Habitat loss on the mainland should be addressed concurrent with discussion of mitigation measures and the foresight of agencies and conservation groups to mitigate habitat losses. The

USFWS notes that the project area is very important to the recovery of Northern Aplomado Falcons, as this is where the species was concentrated historically.

A number of initiatives have been undertaken within the RSA to conserve falcon habitat, primarily establishment of the Laguna Atascosa and Lower Rio Grande national wildlife refuges. It was recognized in the USFWS Recovery Plan (USFWS 1990) that Laguna Atascosa had habitat structure appropriate for the falcon. A milestone of successful falcon restoration was achieved In 1995, when the first successful nesting effort in Texas in 43 years occurred (TPWD 2007).

An example of ongoing government-sponsored conservation effort in the RSA includes 2009 funding for acquisition of 1,242 acres of resaca thorn-scrub habitat, as discussed previously. The Northern Aplomado Falcon is anticipated to benefit from this conservation effort (Newspaper Tree 2009).

An example of a collaborative public-private falcon conservation effort is the Peregrine Fund, which helped enroll more than 10,000 acres of suitable Northern Aplomado Falcon habitat in the USFWS Safe Harbor Program during 2008 (Peregrine Fund 2010). The Safe Harbor Program, administered by the USFWS, allows the Peregrine Fund to work with private landowners to voluntarily to achieve the goal of reintroducing the Northern Aplomado Falcon to south Texas (USFWS 2010).

Potentially, strengthening and rigorous enforcement of the City of Brownsville floodplain management ordinance[15] could slow or reduce loss of potential falcon habitat occurring within city limits (**Exhibit 6-5**).

The USFWS has authority over actions affecting threatened and endangered species; impacts which are compliant with the Endangered Species Act are anticipated to be minor. However, reliance on regulatory programs to ensure future environmental protection does not provide complete protection of the regulated resource. Regulations are subject to violation, and not all impacts to falcons would be permitted or reported and not all violations would be discovered and pursued. Moreover, impacts to potential habitats where no falcon occurrence is recorded need not be reported to the USFWS.

It is important to stress with regard to this project that CCRMA has been in ongoing consultation with the USFWS, TPWD, the NMFS, and the GLO throughout project development, and would coordinate the project with these agencies by sending them copies of the South Padre Island Proposed 2nd Access Project draft environmental impact statement and final environmental impact statement documents for their review and comments. In addition, a Biological Evaluation (BE) would be prepared for consultation with these agencies.

Ocelot and Jaguarundi

No critical habitat has been established for these species. Thus, it becomes more crucial that habitat loss protections are strengthened where needed, fully implemented, and consistently enforced. Moreover, habitat loss should be addressed concurrent with discussion of mitigation measures and the foresight of agencies and conservation groups to mitigate habitat losses.

[15] Brownsville, Texas, Code of Ordinances, Chapter 308, Article II – Floodplain Management. http://library.municode.com/index.aspx?clientId=10297

Less than 50 ocelots are estimated to remain in the U.S., all in the lower Rio Grande valley. An estimated fewer than 15 jaguarundi remain in south Texas; however, the last confirmed record was in 1986 (USFWS 2009). Efforts aimed at preserving and restoring native brush are necessary to support any remaining jaguarundi, particularly in eastern Cameron and Willacy counties. (USFWS 2009)

A number of initiatives have been undertaken within the RSA to conserve ocelot/jaguarundi habitat, the foremost being the establishment of the Laguna Atascosa and Lower Rio Grande national wildlife refuges. According to the USFWS Recovery Plan (USFWS 1990b), which cites LANWR as the lead recovery station for ocelots, a successful land protection plan should be developed for areas around these refuges, as well as counties north of this area. The Plan outlines the necessity of preservation of a minimum of 49,400 acres of prime ocelot habitat in Texas, either in a single block or continuous blocks connected by corridors. The Recovery Plan emphasizes the need for suitable habitat corridors that allow sufficient movement for gene flow and recolonization, factors that are necessary for the remaining ocelot population. According to the USFWS (2009), long-term survival of this species depends not only on the protection of habitat and corridors between habitats, but also on addressing the small population sizes, with attendant genetic impairments from inbreeding. It is reported that ocelots in the LANWR vicinity have lost nearly all of their genetic diversity. Proper ocelot crossing underpasses are essential to maintaining and enhancing habitat connectivity in order to address this problem and facilitate ocelot recovery. As detailed in **Chapter 7**, wildlife crossings benefitting the ocelot are planned for incorporation into the 2nd Access project design.

An example of governmental agency effort geared toward restoration of previously cleared ocelot and jaguarundi habitat includes the USDA's Conservation Reserve Program (CRP) entitled the Lower Rio Grande Valley Thornscrub Restoration Project (USFWS 2009). This project provides cost share to landowners for establishing Tamaulipan thornscrub on their land. Private partner groups assisting in this effort includes the Environmental Defense Fund (2009) and Texas Nature Conservancy. Soils series that support thorn-scrub brush restoration efforts (Harveson *et. al.*[16]) are prevalent in southern and eastern mainland Cameron County.

Another example of ongoing government-sponsored conservation effort in the RSA includes 2009 funding for acquisition of 1,242 acres of resaca thorn-scrub habitat, as discussed previously. The ocelot is anticipated to benefit from this conservation effort. (Newspaper Tree 2009).

The Recovery Plan (1990) emphasizes that suitable habitat corridors that allow sufficient movement for gene flow and recolonization are necessary for the remaining ocelot population This need is still recognized. According to the USFWS (2009), long-term survival of this species depends not only on the protection of habitat and corridors between habitats, but also on addressing the small population sizes, with attendant genetic impairments from inbreeding. In fact, it is reported that ocelots in the LANWR vicinity have lost nearly all of their genetic diversity. Toward that goal, and as discussed previously, wildlife crossings for ocelot movement between habitats are proposed for incorporation into the 2nd Access project design.

The USFWS has authority over actions affecting threatened and endangered species; impacts which are compliant with the Endangered Species Act are anticipated to be minor. However, reliance on regulatory programs to ensure future environmental protection does not provide

[16] Harveson, Patricia M., M.E. Tewes, G.L. Anderson, and L.L. Laack. *Habitat use by ocelots in south Texas: implications for restoration*. Wildlife Society Bulletin 2004, 32(3):948-954

complete protection of the regulated resource. Regulations are subject to violation, and not all impacts to the ocelot or jaguarundi would be permitted or reported and not all violations would be discovered and pursued. Moreover, impacts to potential habitats where no falcon occurrence is recorded need not be reported to the USFWS.

It is important to stress with regard to this project that CCRMA has been in ongoing consultation with the USFWS, TPWD, the NMFS, and the GLO throughout project development, and would coordinate the project with these agencies by sending them copies of the South Padre Island Proposed 2nd Access Project draft environmental impact statement and final environmental impact statement documents for their review and comments. In addition, a Biological Evaluation (BE) would be prepared for consultation with these agencies.

6.3.6 Threatened and Endangered Species and State–Listed Rare Species – Laguna Madre and Gulf of Mexico

6.3.6.1 Step 1: Resource Identification - Threatened and Endangered Species and State–Listed Rare Species – Laguna Madre and Gulf of Mexico

The following species are associated with deepwater, mudflat and salt flat habitats of the Laguna Madre and Gulf of Mexico off South Padre Island. This includes five turtles, four fish, one mammal and eight bird species (**Table 6-27**). While not a listed or rare species, the bottlenose dolphin, a marine mammal protected under the Marine Mammal Protection Act (MMPA) is also associated with Laguna and Gulf habitats.

Table 6-27: Threatened and Endangered Species and State–Listed Rare Species in the RSA

Federal/State Threatened and Endangered Species	State State–Listed Rare Species	Protected Under Marine Mammal Protection Act
West Indian manatee	Western Snowy Plover	West Indian manatee
Loggerhead sea turtle	Southeastern Snowy Plover	Bottlenose dolphin
Green sea turtle	-	
Leatherback sea turtle	-	
Hawksbill sea turtle	-	
Kemp's ridley sea turtle	-	
Brown Pelican	-	
Mexican goby	-	
River goby		
Smalltooth sawfish	-	
Opossum pipefish	-	
Piping Plover		
Reddish Egret	-	
Wood Stork	-	
Eskimo Curlew	-	
White-faced Ibis	-	

Source: TPWD (2009); USFWS (2009)

Laguna Madre seagrass beds provide habitat for five turtle species. Deepwater areas of the Laguna Madre and Gulf of Mexico provide potential habitat for the West Indian manatee and bottlenose dolphin and feeding habitat for the Brown Pelican, while shallow waters provide habitat for the Mexican goby and the smalltooth sawfish. Mud and salt flats associated with the Laguna Madre, including designated critical habitat for the threatened Piping Plover, provide habitats for seven species of shorebirds.

As development and commercial and recreational activity continue to increase in and near the Laguna Madre and South Padre Island gulf waters, these habitats become increasingly threatened, potentially resulting in the decline of listed species and rare species. The importance of conservation efforts to facilitate recovery and conservation of these species, as expressed in the federal and state legislation, make analysis necessary.

6.3.6.2 Step 2: RSA – Threatened and Endangered Species and Species of Concern - Laguna Madre and Gulf of Mexico

The RSA for Laguna Madre threatened and endangered species is shown in **Exhibit 6-6**. It consists of the Laguna Madre in Cameron County and extending northward up to the Port Mansfield vicinity in Willacy County and associated deepwater marine areas including South Bay, the Brownsville shipping channel, and open gulf waters. The RSA also includes portions of Port Isabel due to the area's direct connection to the waters of the Laguna Madre. The RSA for Laguna Madre threatened and endangered species comprises 234,777 acres.

6.3.6.3 Step 3: Resource Health and Historical Context – Threatened and Endangered Species and State–Listed Rare Species - Laguna Madre and Gulf of Mexico

Based on examination of 1977 and 2008 aerial photography, an estimated 950.0 acres (0.4 percent) of the RSA were developed in 1977 and approximately 989.7 acres (0.4 percent) were developed in 2008. A total of 18 subdivisions totaling approximately 1,231.9 acres (0.5 percent) are currently under development. Therefore, approximately 2,221.6 acres (0.9 percent) of the Laguna Madre and Gulf of Mexico threatened and endangered species RSA is currently developed or under development. Additionally, 7,366.9 acres are currently designated critical habitat, and 169,775.3 acres are open water. Therefore, 57,699.5 acres are available for development.

Laguna Madre seagrass beds provide habitat and food source for sea turtles and, potentially, for the West Indian manatee.

Laguna Madre threatened and endangered species and rare species have sometimes figured prominently in the local economy. For example, Laguna Madre Turtle canneries processed many tons of sea turtle meat in the mid-1800s before the industry collapsed around 1900. Green turtles comprised most of the historic catch from the lower Laguna Madre (Tunnell and Judd, 2002). The Piping Plover provides a more recent example of the economic importance of Laguna Madre listed species. Over 700,000 birdwatchers visit the Laguna Madre yearly to view more than 400 species of birds, including the threatened Piping Plover, which finds its best remaining winter habitat on Laguna mud and salt flats (USFWS 2001).

The lower Laguna Madre receives significant quantities of agricultural pesticides and other environmental contaminants from the Arroyo Colorado. Other threats include oil spills and pollutants from the Mexican side of the Rio Grande (TPWD 2009). Rapid population growth in the Lower Rio Grande Valley is associated with high nutrient inputs from municipal and industrial sources, agricultural runoff and shrimp farm discharge. Moreover, low Rio Grande flows create insufficient freshwater inflow to the Laguna Madre. Dredging and spoil removal are also primary threats to the Laguna ecosystem (TPWD 2005).

The Laguna Madre is partly owned by public entities including the Texas General Land Office, TPWD and USFWS, while private entities such as the Audubon Society and King Ranch own some areas (TPWD 2009).

Conservation areas established for mainland threatened and endangered species and rare species also emphasize conservation of Laguna habitats and species. The LANWR is the primary Laguna Madre conservator in the RSA. In 2007, the Nature Conservancy donated its 1,500-acre South Padre Island Preserve to the USFWS for inclusion in the LANWR. Located on the northern end of South Padre Island and stretching southward into Cameron County to a point about 10 miles north of the city of South Padre Island, it exemplifies recent conservation initiatives benefitting the Laguna. This area provides habitat for Kemp's ridley, loggerhead and green sea turtles, Peregrine Falcons, Piping Plovers and Brown Pelicans (Nature Conservancy 2009).

The USFWS established critical habitat for the Piping Plover, including 7,366.9 acres in the RSA, along the Laguna Madre; 2,286.3 acres are located within LANWR while the remaining 5,080.6 acres occur outside the refuge. While not a prohibition to development, a critical habitat designation affects activities with federal involvement, such as federal funding or a federal permit. No other critical habitats occur in the RSA.

The TxDOT guidance on cumulative impacts analysis requires the NEPA practitioner to evaluate resources that are in poor or declining health or at risk, even if project impacts are minor.

Sea Turtles – Kemp's ridley, Green, and Loggerhead

These sea turtle species occupy Laguna Madre seagrass foraging habitats and other Laguna and gulf habitats. As with other listed and rare species in the RSA, most of these habitats are intact; however, these have been modified and impacted by anthropogenic development-related effects. As a result, this resource is in decline. Decrease in Laguna Madre seagrass has been noted since the 1970s (TPWD 2009). In Texas, approximately 235,000 acres of seagrasses has been lost as of 1994 (TPWD 1999). Kemp's ridley sea turtles return yearly to nest along the same beaches in the Laguna Madre (Nature Conservancy 2009). A recent study of sea turtle strandings along the southern Texas coast showed loggerhead turtles to be most frequent, followed by Kemp's ridley, green and leatherback turtles. The SPI 2nd Access Project has potential for direct adverse effect to these species (**Chapter 4**). As a result, cumulative impacts will be evaluated further.

Brown Pelican

The Brown Pelican inhabits open water Laguna Madre and open gulf habitats, as well as rookeries within the Laguna. Structures such as the Queen Isabella causeway provide perches for pelicans. The SPI 2nd Access Project has potential for direct adverse effect to this species (**Chapter 4**). As a result, cumulative impacts to the Brown Pelican will be evaluated further.

6.3.6.4 Step 4: Direct and Indirect Impacts – Threatened and Endangered Species and State–Listed Rare Species - Laguna Madre and Gulf of Mexico

Within the RSA, the proposed project would have direct impacts ranging from 5.1 to 19.8 acres of estuarine wetlands and from 72.8 to 113.3 acres of sea turtle/manatee habitat would be impacted, depending on the build alternative and habitat acreage affected by underground utility relocation outside the proposed 2nd Access ROW, if required (**Table 6-28**).

Table 6-28: Direct and Indirect Habitat Impacts By Alternative within the RSA

Alternative	Wetlands* (acres)	Manatee and Turtle ** (acres)
1	16.7	104.3
2	17.7	104. 3
3	19.8	105.0
4	15.9	113. 3
5	16.9	113. 3
6	16.1	112.8
7	17.2	112.8
8	5.4	76.8
9	6.2	76.8
10	5.1	72.8
11	6.1	72.8

Source: project design data and GIS analysis (2009)
*Estuarine – Saltmarsh, mud/saltflat
**Based partly on acreage of seagrass impacted; seagrass is a major food source.

Seagrasses could also be temporarily impacted by suspended sediments from project construction activities. No permanent best management practices are proposed for the Laguna Madre crossing component of the project. This would result in an increase in impervious cover and greater volumes of runoff with roadway pollutants affecting the Laguna Madre during storm events, an indirect effect. An additional indirect effect could result from accidental spills on the causeway could result in contaminants introduced to the Laguna Madre.

Because undeveloped portions of the RSA consist largely of open water areas, there is little opportunity for induced development within the RSA boundary. However, according to the *Proposed South Padre Island Second Access Project Economic Analysis* report, the proposed project could induce up to an estimated 402.1 acres of induced development immediately adjacent to the RSA, 239.8 acres on South Padre Island and 162.3 acres on the mainland (TXP, Inc. 2009). Development-related addition of impervious cover near the RSA could affect quality of runoff entering the RSA, potentially affecting habitats such as Laguna Madre seagrass beds. However, these threats would be minimized by engineered water quality controls, which would be anticipated to be implemented in conjunction with subdivision or roadway development. The TCEQ requires temporary and permanent best management practices designed to assure that unacceptable impacts to water quality are avoided, both from construction activity and from developed areas. As a result, these indirect effects would not be anticipated to be significant.

6.3.6.5 Step 5: Reasonably Foreseeable Actions – Threatened and Endangered Species and State–Listed Rare Species - Laguna Madre and Gulf of Mexico

A total 6 subdivisions totaling approximately 111.2 acres slotted for future development (all parcels and platted lots vacant). Subdivision information for the RSA is listed in **Table 6-29**.

Table 6-29: Subdivisions in the Threatened and Endangered Species and State–Listed Rare Species – Laguna Madre and Gulf of Mexico RSA

Subdivision Name	No. of Lots	Acreage
SANTA ISABEL GRANT PORT ISABEL	81	687.7
PORT ISABEL ORIGINAL TOWNSITE	919	178.8
PADRE ISLAND UNSUBDIVIDED ABST 260	14	145.6
FIESTA ISLES SUBDIVISION	254	63.1
GARCIA BAYFRONT SUBDIVISION	13	58.7
PADRE BEACH ESTATES SUBDIVISION	52	57.8
MODERN VENICE SUBDIVISION	209	34.5
PADRE BEACH ACRES SUBDIVISION	3	13.7
RUTHERFORD- HARDING ADDITION	33	11.6
LAGUNA BEACH ADDITION I	22	10.9
LAGUNA BEACH ADDITION II	11	10.2
FRONTON SUBDIVISION	1	9.8
PORT-O-CALL ESTATES	76	8.6
QUEEN'S POINT SUBDIVISION	2	6.5
BOARDWALK CONDOMINIUMS	2	6.1
BLACOR SUBDIVISION	1	4.6
KING RESUBDIVISION S PADRES ISLAND	15	4.6
CROSSLAND BAY FRONT SUBDIVISION	7	4.5
KING II SUBDIVISION	3	3.9
HARBOR ISLAND SUBDIVISION SEC II	9	3.0
HARBOR ISLAND SUBDIVISION 1	56	2.6
THE POINT AT NORTH SHORE	7	2.6
OYSTER COVE CONDOS 1	2	2.3
UNNAMED	3	2.3
PORT-O-CALL ESTATES UNIT 3	25	2.2
FOSTER & HARRIS ADDITION	16	2.2
HARBOR HAVEN SUBDIVISION	6	2.0
LAS BRISAS CONDOMINIUMS	1	1.9
WOMACK ADDITION	3	1.9
MARINA SUBD OF PADRE BEACH ESTATES	11	1.5
FROST SUBDIVISION	1	1.3
LANDFALL TOWER CONDOMINIUMS	3	1.0
THE MOORINGS CONDOS	1	1.0
FOSTER & HARRIS ADDITION	3	0.5
FURNEY ADDITION	3	0.3
KINGS LANDING II CONDOMINIUMS	1	0.4
KINGS LANDING I CONDOMINIUMS	1	0.4
TOTAL SUBDIVISIONS (37)	1,879	1350.60

Source: Cameron County Appraisal District 2009

Except for the proposed 2nd Access Project, there are no reasonably foreseeable Brownsville Metropolitan Planning Organization, Harlingen-San Benito Metropolitan Planning Organization and TXDOT Surface Transportation Improvement Program projects within the RSA boundary. However, according to *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009), an additional 397.0 acres of induced development beyond that induced by the

proposed 2nd Access Project could occur adjacent to the RSA by 2045, as a result of full build-out of the other CCRMA Planned roadway projects.

6.3.6.6 Step 6: Cumulative Impacts Assessment – Threatened and Endangered Species and State–Listed Rare Species - Laguna Madre and Gulf of Mexico

In this step, cumulative impacts are identified and the magnitude of those effects is evaluated.

Development pressure and associated loss of habitat are the main threats to threatened and endangered species and rare species in the RSA; therefore, it is important to review relevant regulations related to development impacts within the RSA.

The Endangered Species Act of 1973 provided for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife and plants depend. The Act authorizes the determination and listing of species, prohibits unauthorized taking of endangered species, provides authority to acquire land for the conservation of listed species, encourages state-level programs for endangered and threatened wildlife and plant conservation, and authorizes criminal penalties for violating the Act.

The Marine Mammal Protection Act establishes protection for manatees and bottlenose dolphins, including monitoring populations to make sure that they stay at optimum levels. If a population falls below its optimum level, it is designated as "depleted," and a conservation plan is developed to guide research and management actions to restore the population to healthy levels. In 1994, Congress amended the Marine Mammal Protection Act to govern the taking of marine mammals incidental to commercial fishing operations (Gulf of Mexico Fishery Management Council 2005).

In 1973, the Texas legislature authorized the TPWD to establish a list of endangered animals in the state. In 1988, the Texas legislature authorized the Department to establish a list of threatened and endangered plant species for the state. TPWD regulations prohibit the taking, possession, transportation or sale of any of the animal species designated by state law as endangered or threatened without the issuance of a permit. State laws and regulations prohibit commerce in threatened and endangered plants and the collection of listed plant species from public land without a permit issued by TPWD. Listing and recovery of endangered species in Texas is coordinated by the Wildlife Diversity Program.

In 1991, TPWD adopted state goals for protection of threatened and endangered species. These goals reflect the regulatory program of Endangered Species Act legislation that prohibits the taking of species unless authorized by a permit issued under the Endangered Species Act.

The Coastal Barrier Resources Act of 1982 places restrictions on federal funding for development in coastal zones (USFWS 2009). The Act authorizes the Texas Coastal Management Program, which effectively limits development of island habitats. The Texas General Land Office is the lead agency for the Program, which identifies coastal natural resource areas and identifies uses or activities that may adversely affect those areas. The Coastal Coordination Council, which oversees the Program, has authority to review significant actions taken or authorized by state agencies and subdivisions that may adversely affect coastal natural resources. Among the policy provisions is one specifying no net loss of critical area functions and values. The Texas General Land Office also has authority under the Texas Dune Protection Act to prohibit certain dune habitats, potentially protecting listed species or rare species (Texas General Land Office 2009). The Texas General Land Office also has

jurisdiction over the state-owned submerged lands, which is the area from mean high tide along the Gulf beach or bay-estuary shoreline to 10.36 miles offshore in the Gulf.

Analysis of data for subdivisions, roadway information and aerial photo interpretation indicates that approximately 2,221.6 acres have already been fully developed. The majority of this past development is low density residential and roadway land use. Approximately 5,080.6 acres of the RSA has been designated critical habitat for the Piping Plover by the USFWS. While not a prohibition to development, a critical habitat designation necessitates consultation with the USFWS for any action with federal involvement such as funding or permitting (USFWS 2009). Because the RSA consists primarily of open waters of the Laguna Madre and Gulf of Mexico, fee simple, conservation easement, preserves or other conservation land holdings in the RSA are limited to the Laguna Madre land/water boundaries of conservation lands, primarily the LANWR, which also affords some protection from unregulated Laguna Madre access. However, as waters of the state and U.S., the entirety of open water of the RSA is protected from unregulated impacts through the provisions of the Clean Water Act. In summary, the 169,775.3 acres of the RSA's open water, or approximately 72.3 percent of the RSA, is effectively conservation area, largely restricted from development or other disturbance.

The current action accounts for approximately 67.5 to 75.4 acres of additional development, depending on the build alternative[17], within the RSA. While there is little opportunity for induced development within the RSA boundary, a maximum of 402.1 acres of induced development immediately adjacent to the RSA could occur from the proposed 2nd Access Project, with associated potential effects to the Laguna Madre.

Reasonably foreseeable future actions include developments planned and platted within the RSA. Planned future subdivisions account for approximately 71.3 acres. An additional 397.0 acres of induced development could occur adjacent to the RSA as a result full build-out of the other CCRMA roadway projects, with associated potential water quality effects to the Laguna Madre.

Refer to **Table 6-30** for a summary of the potential cumulative effect area within RSA.

[17] Footprint of ROW; however, roadway within RSA is almost entirely on structure. As a result, actual direct impacts are much less, from bridge abutment and pier placement only.

Table 6-30: Potential Cumulative Effect within the Threatened and Endangered Species and State–Listed Rare Species – Laguna Madre and Gulf of Mexico RSA

Type of Action	Past Actions	Current Action*	Reasonably Foreseeable Actions	Cumulative Effect**
Development	950.0 acres development in 1977 989.7 acres of development in 2008 1,231.9 acres currently under development 41.1 acres of roads Total Development = 2,263.7 acres	Direct Impact - max. 113.3 acres Indirect Impact – 0.5 acres impact to foraging habitat Approximately 402.1 acres induced development Total Development = 515.4 acres Total Impact to Laguna and Gulf T&E Species = 113.8 acres	71.3 acres of subdivisions 397.0 acres induced development from other CCRMA Plan projects Total Development = 468.3 acres	3,134.1 acres of development within and adjacent to the RSA 113.8 acres impact to Laguna and Gulf T&E Species
Conservation	169,775.3 acres of conservation area	-	-	169,775.3 acres of conservation area
Ratio (D:C)***	-	-	-	1:21.9

Source: HNTB (2009)
* Assumes that subdivisions currently being developed will continue to develop prior to the letting date of the 2nd Access Project.
**Incorporates highest potential direct impact.
***Ratio of Development acreage to Conservation acreage

6.3.6.7 Step 7: Results – Threatened and Endangered Species and Species of Concern - Laguna Madre and Gulf of Mexico

The threats described in recovery plans and other conservation documents were reviewed to understand the potential cumulative effect on threatened and endangered species in the RSA. Potential cumulative effects to which the current action could contribute include effects to seagrass habitat (NOAA Fisheries and USFWS 2002), potentially impacting turtle species and the West Indian manatee, and inducement of development adjacent to the RSA, leading to degradation of Laguna water quality.

Habitat quality deterioration from physical disturbance and degraded water quality would be the most likely cause of impacts to Laguna Madre threatened and endangered species and rare species in the RSA. Water quality degradation would result from sediment and pollutant inputs due to runoff from agricultural lands, conversion of neighboring lands to developed uses and dredging activity. Dredging or construction activity such as bridge placement could result in direct disturbance of sensitive habitats.

However, extensive protected areas exist in the RSA, totaling 169,775.3 acres of open water and seagrass beds, as well as Piping Plover critical habitat.

The proposed project's impact to threatened and endangered species and rare species and their habitats would be minimized by design undertaken in consultation with the USFWS and

TPWD and by compliance with federal and state laws. As a result, the proposed project would not substantially contribute to significant cumulative impacts to threatened and endangered species and rare species associated with the Laguna Madre. Because of the abundance of conservation lands in the RSA, as well as the no-take policy, the cumulative effect of development near the Laguna Madre is expected to retain a large proportion of Laguna threatened and endangered species and rare species habitats within the RSA. It should be noted; however, that this does not assure recovery of these species. Increased land values resulting from project-induced and other local development could make lands proposed for conservation acquisition unavailable for purchase.

Sea Turtles – Kemp's ridley, Green, and Loggerhead

The threats described in conservation documents were reviewed to understand the potential cumulative effect on Kemp's ridley, Green, and Loggerhead sea turtles within the RSA. Loggerhead and green sea turtles have been identified in the vicinity of Mansfield Channel, and according to the USFWS, hundreds of green sea turtles regularly occur in the Lower Laguna Madre.

Decrease in Laguna Madre sea turtle seagrass (foraging) habitats has been noted since the 1970s (TPWD 2009). In Texas, approximately 235,000 acres of seagrasses has been lost as of 1994 (TPWD 1999). The Nature Conservancy states that shoalgrass has decreased by 60.0 percent in 20 years while totally de-vegetated areas have increased almost three-fold.

Dredging and filling activities have been widely recognized as one of the major anthropogenic disturbances contributing to the destruction of seagrass meadows, due to direct burial and from the disturbance of sediments and low dissolved oxygen caused by dredging operations. Excess non-point source nutrient pollutants in runoff are associated with algae blooms, such as 'brown tide' which are detrimental to seagrass beds. Light reduction from maintenance dredging of the Gulf Intracoastal Waterway was the suspected cause of large-scale loss of seagrass cover in deep parts of the Laguna Madre between surveys conducted in 1965 and 1974 (TPWD 1999).

Development along shorelines may affect conditions of water depth and currents and cause loss of seagrasses. Artificial stabilization using bulkheads, rip-rap and other erosion control measures can contribute to deeper-water conditions near shore by inhibiting the natural development of a broad, shallow and gently-sloping bay margin profile. Improperly designed, piers and overwater structures present special problems to seagrass habitats through surface light reduction, affecting underlying seagrass beds (TPWD 1999). Other development-related effects include increased boating recreation and associated prop scarring of seagrass beds.

In addition to seagrass, sea turtles are known to utilize other Laguna Madre habitats. Dormant wintering loggerhead turtles could potentially be found buried in mud bottoms of the Laguna Madre, and green sea turtles typically sleep in shallow bottoms. Other development-related effects include increased potential for sea turtle strikes from recreational boating.

Potential cumulative effects to sea turtle seagrass habitat to which the current action could contribute include direct impacts from project construction, shading encroachment impacts with associated seagrass loss, and inducement of local development with associated increased potential for associated impacts to sea turtle seagrass and other Laguna Madre habitats as noted above.

However, extensive protected areas exist in the RSA, totaling 169,775.3 acres of open water and seagrass beds; seagrass meadows in the Laguna Madre are still abundant. As waters of

the state and U.S., the entirety of open water of the Laguna Madre is protected from unregulated impacts through the provisions of the Clean Water Act.

The proposed project's impact to Kemp's ridley, green, and loggerhead sea turtles and their habitats would be minimized by design undertaken in consultation with the USFWS and TPWD and by compliance with federal and state laws. As a result, the proposed project would not substantially contribute to significant cumulative impacts to these species. Because of the abundance of local conservation lands, as well as the no-take policy, the cumulative effect of development near the Laguna Madre is expected to retain a large degree of protection for these species and their habitats. As noted previously, however, this does not assure recovery of these sea turtle species.

Brown Pelican

The Brown Pelican is a state listed endangered species, recently delisted by USFWS, and still within its five year monitoring period. The threats described in conservation documents were reviewed to understand the potential cumulative effect on the Brown Pelican within the RSA. Brown Pelicans are common throughout the study area and were observed during site surveys. Suitable nesting and foraging habitat for the Brown Pelican occurs throughout the Laguna Madre. Nests are typically found in mangrove trees or similar size vegetation or on the ground and usually occur in colonies. Colonial waterbird rookeries frequented by Brown Pelicans are found in the Laguna Madre. The deposition of dredged spoil piles related to the construction and maintenance of the Gulf Intracoastal Waterway has provided artificial nesting habitats for colonial waterbirds that are isolated from disturbance and predators and are located adjacent to shallow and open waters teeming with fish and crustaceans. Between 1977 and 2006, the Laguna Vista Spoil rookery provided nesting habitat for 21 species of birds, including the Brown Pelican.

The main cause for the historical decline of the Brown Pelican was due to the use of DDT, an agricultural pesticide. The DDT would cause the birds to lay thin-shelled eggs which would break during incubation. Since DDT was banned in 1972, the Brown Pelican has made a steady comeback

Potential cumulative effects to the Brown Pelican to which the current action could indirectly contribute (encroachment-alteration) include impacts from vehicle strikes; wind currents in the vicinity of the existing Queen Isabella Memorial Causeway are known to disrupt pelican flight, sometimes resulting in vehicle strike mortality. Similar impacts would be expected from the proposed 2nd Access project. Cumulative impacts could also include indirect encroachment-alteration effects to colonial waterbird rookeries, specifically loss of habitat effectiveness. Operation and maintenance of the Laguna Madre crossing would result in a low level of disturbance from traffic noise and vehicle activity, with occasional higher levels of noise during periodic maintenance activities. Similar low-level noise disturbance from project-induced development would also be anticipated. Specifically, the increase in development into areas near the proposed landing for the bridge on South Padre Island and to the north of the landing would likely lead to additional marinas and increased recreational boating in the Laguna Madre in areas that have previously been fairly isolated from such impacts, reducing rookery effectiveness. No induced growth effects to spoil island rookeries would be anticipated, since these areas are not suitable for development.

Extensive protected areas exist in the RSA, totaling 169,775.3 acres of open water. Although not protected, spoil islands provide rookery sites not subject to development. As waters of the

state and U.S., the entirety of open water of the Laguna Madre, and wetland portions of spoil islands, is protected from unregulated impacts through the provisions of the Clean Water Act.

The proposed project's impact to the Brown Pelican would be minimized by design undertaken in consultation with the USFWS and TPWD and by compliance with federal and state laws. A warning system similar to the one on the Queen Isabella Memorial Causeway would be included in the project design to notify drivers of the potential risk of pelican strikes during windy conditions. As a result, the proposed project would not substantially contribute to significant cumulative impacts to this species. Because of the abundance of local conservation lands, as well as the no-take policy, the cumulative effect of development near the Laguna Madre is expected to retain a large degree of protection for the Brown Pelican and its habitats.

6.3.6.8 Step 8: Mitigation – Threatened and Endangered Species and State–Listed Rare Species - Laguna Madre and Gulf of Mexico

It is anticipated that this development trend would continue as the region continues to grow. However, if development rates increase in intensity, habitat loss for Laguna Madre threatened and endangered species and rare species could occur over time. Thus, it becomes more crucial that habitat loss protections are strengthened where needed, fully implemented, and consistently enforced.

It is impossible to discuss Laguna Madre and Gulf and mudflat and sandflat habitat loss without addressing mitigation measures and the foresight of agencies and conservation groups to mitigate these losses. Above in Step 6 are descriptions of agency regulatory measures implemented throughout the RSA.

The USFWS has authority over actions affecting threatened and endangered species and may require restoration, creation, enhancement or preservation of habitat features as compensation to offset unavoidable adverse impacts to the species. This means of compensatory mitigation is intended to comply with the general goals of the Endangered Species Act and the specific goal of de-listing.

In addition, a number of initiatives have been undertaken within the RSA to conserve habitats for threatened and endangered species and rare species. These include establishment of LANWR, including lands acquired for the refuge by the Nature Conservancy.

Reliance on regulatory programs to ensure future environmental protection does not provide complete protection of the regulated resource. Regulations are subject to violation, and not all losses of threatened and endangered species and rare species would be permitted or reported and not all violations would be discovered and pursued. There is some likelihood that take would occur in conjunction with some of the proposed development in the RSA. Impacts to potential habitats where no species occurrence is recorded need not be reported to the USFWS, so some loss of habitat is possible. Impacts which are compliant with the Endangered Species Act are anticipated to have minor impacts. Those which are non-compliant may result in unmitigated loss of habitat.

It is important to stress with regard to this project that CCRMA has been in ongoing consultation with the USFWS and TPWD throughout project development, and would coordinate the project with these agencies by sending copies of the South Padre Island Proposed 2nd Access Project draft environmental impact statement and final environmental impact statement documents for their review and comments. In addition, a Biological Evaluation (BE) would be prepared for

consultation with the USFWS, TPWD, NMFS, and GLO. Wherever applicable, the determination of the appropriateness of mitigation and development of specific mitigation efforts would occur in coordination with TPWD, USFWS, CCRMA, TxDOT, and the USACE.

Sea Turtles – Kemp's ridley, Green, and Loggerhead

Development trends are anticipated to continue as the region continues to grow. However, if development rates increase in intensity, habitat impacts and loss for Laguna Madre sea turtles could occur over time. Thus, it becomes more crucial that habitat loss protections are strengthened where needed, fully implemented, and consistently enforced.

It is impossible to discuss Laguna Madre and Gulf and mudflat and sandflat habitat loss without addressing mitigation measures and the foresight of agencies and conservation groups to mitigate these losses. As discussed previously, the Endangered Species Act, Marine Mammal Protection Act, TPWD regulations, and the Coastal Barrier Resources Act afford a measure of habitat protection for Laguna Madre sea turtle species.

The USFWS has authority over actions affecting threatened and endangered species and may require restoration, creation, enhancement or preservation of habitat features as compensation to offset unavoidable adverse impacts to the species. This means of compensatory mitigation is intended to comply with the general goals of the Endangered Species Act and the specific goal of de-listing.

In addition, a number of initiatives have been undertaken within the RSA to conserve habitats for threatened and endangered species and rare species. These include establishment of LANWR, including lands acquired for the refuge by the Nature Conservancy.

Reliance on regulatory programs to ensure future environmental protection does not provide complete protection of the regulated resource. Regulations are subject to violation, and not all losses of threatened and endangered species and rare species would be permitted or reported and not all violations would be discovered and pursued. There is some likelihood that take would occur in conjunction with some of the proposed development in the RSA. Impacts to potential habitats where no species occurrence is recorded need not be reported to the USFWS, so some loss of habitat is possible. Impacts which are compliant with the Endangered Species Act are anticipated to have minor impacts. Those which are non-compliant may result in unmitigated loss of habitat.

It is important to stress with regard to this project that CCRMA has been in ongoing consultation with the USFWS and TPWD throughout project development, and would coordinate the project with these agencies by sending copies of the South Padre Island Proposed 2nd Access Project draft environmental impact statement and final environmental impact statement documents for their review and comments. In addition, a Biological Evaluation (BE) would be prepared for consultation with the USFWS, TPWD, NMFS, and GLO. Wherever applicable, the determination of the appropriateness of mitigation and development of specific mitigation efforts would occur in coordination with TPWD, USFWS, CCRMA, TxDOT, and the USACE.

Brown Pelican

Development trends are anticipated to continue as the region continues to grow. However, if development rates increase in intensity, habitat impacts and loss for the Brown Pelican could occur over time. Thus, it becomes more crucial that habitat loss protections are strengthened where needed, fully implemented, and consistently enforced.

It is impossible to discuss Laguna Madre habitat loss without addressing mitigation measures and the foresight of agencies and conservation groups to mitigate these losses. As discussed previously, the Endangered Species Act, Marine Mammal Protection Act, TPWD regulations, and the Coastal Barrier Resources Act afford a measure of protection for Laguna Madre species and/or their habitats.

The USFWS has authority over actions affecting threatened and endangered species and may require restoration, creation, enhancement or preservation of habitat features as compensation to offset unavoidable adverse impacts to the species. This means of compensatory mitigation is intended to comply with the general goals of the Endangered Species Act and the specific goal of de-listing. As noted, the Brown Pelican has been delisted from the federal list of threatened and endangered species and is in recovery.

In addition, a number of initiatives have been undertaken within the RSA to conserve habitats for threatened and endangered species and rare species. These include establishment of LANWR, including lands acquired for the refuge by the Nature Conservancy. The Texas General Land Office, in cooperation with the TPWD, USFWS, the Texas Audubon Society and Texas Colonial Waterbird Society, has identified colonial waterbird rookery areas in the Texas coastal counties and bays. The USFWS Texas Coastal Program protects and manages habitat for colonial waterbirds on island rookeries and acts to minimize human disturbance. Data collected during the Texas Colonial Waterbird Census is intended for following long-term trends of colonial waterbird numbers along the Texas coast.

The deposition of dredged spoil piles related to the construction and maintenance of the Gulf Intracoastal Waterway has provided artificial nesting habitats for colonial waterbirds that are isolated from disturbance and predators and are located adjacent to shallow and open waters teeming with fish and crustaceans. Similar benefits could potentially accrue from future spoil piles deposited in the Laguna Madre in conjunction with development projects.

Reliance on regulatory programs to ensure future environmental protection does not provide complete protection of the regulated resource. Regulations are subject to violation, and not all losses of threatened and endangered species and rare species would be permitted or reported and not all violations would be discovered and pursued. There is some likelihood that take would occur in conjunction with some of the proposed development in the RSA. Impacts to potential habitats where no species occurrence is recorded need not be reported to the USFWS, so some loss of habitat is possible. Impacts which are compliant with the Endangered Species Act are anticipated to have minor impacts. Those which are non-compliant may result in unmitigated loss of habitat.

It is important to stress with regard to this project that CCRMA has been in ongoing consultation with the USFWS and TPWD throughout project development, and would coordinate the project with these agencies by sending copies of the South Padre Island Proposed 2nd Access Project draft environmental impact statement and final environmental impact statement documents for their review and comments. In addition, a Biological Evaluation (BE) would be prepared for consultation with the USFWS, TPWD, NMFS, and GLO. Wherever applicable, the determination of the appropriateness of mitigation and development of specific mitigation efforts would occur in coordination with TPWD, USFWS, CCRMA, TxDOT, and the USACE. As discussed previously, a warning system similar to the one on the Queen Isabella Memorial Causeway would be included in the project design to notify drivers of the potential risk of pelican strikes during windy conditions.

6.3.7 Threatened and Endangered Species and State–Listed Rare Species – Island Habitats

6.3.7.1 Step 1: Resource Identification - Threatened and Endangered Species and State–Listed Rare Species – Island Habitats

The following species are found in South Padre Island dune, beach and mud and salt flat habitats. This includes seven birds, one beetle and one lizard (**Table 6-31**).

Table 6-31: Threatened and Endangered Species and State–Listed Rare Species in the RSA

Federal/State Threatened and Endangered Species	State State–Listed Rare Species
Piping Plover	Smyth's tiger beetle
Reddish Egret	Keeled Earless Lizard
Wood Stork	Western Snowy Plover
Eskimo Curlew	Southeastern Snowy Plover
White-faced Ibis	-

Source: TPWD (2009); USFWS (2009)

Sand dunes provide potential habitat for listed species and rare species including one lizard and one beetle. Mud and salt flats provide habitats for seven species of shorebirds.

As development continues to occur on South Padre island, these habitats become increasingly scarce and fragmented, resulting in the decline of listed species and rare species in the RSA. The importance of conservation efforts to facilitate the recovery of these species, as expressed in the federal and state Endangered Species Acts, make analysis necessary.

6.3.7.2 Step 2: RSA – Threatened and Endangered Species State–Listed Rare Species - Island Habitats

The RSA for island threatened and endangered species and rare species is shown in **Exhibit 6-7**. It consists of South Padre island and associated sand and mud flats and comprises 25,734 acres. Approximately 19,096.2 acres are designated critical habitat. Although not a deterrent to development, it is reasonable to expect that the majority of the development would occur outside these areas. Therefore, for purposes of this analysis, approximately 6,260.8 acres (24.7 percent) is considered available for development.

6.3.7.3 Step 3: Resource Health and Historical Context – Threatened and Endangered Species and State–Listed Rare Species - Island Habitats

Land use changes typically drive loss of listed species and rare species habitats. The conversion of island habitats to developed uses is the main threat to these species. Many of these habitats have been converted to developed uses.

Padre Island includes a long undeveloped stretch of coastal barrier island, as well as extensive dune, rangeland, ephemeral freshwater marshes and ponds and estuarine tidal salt flats on the gulf side and mud flats on the west side. A narrow dune ridge runs almost the length of the entire island. Few trees occur on the island, mostly sparse mesquite, live oak, or willow (USPS 2009). Padre Island is an important area for over 350 species of migratory, wintering and resident bird species. Beaches provide nesting habitat for the Kemp's ridley sea turtle, the most endangered sea turtle in the world, as well as for loggerhead and green sea turtles. Threatened

Piping Plovers, as well as Snowy Plovers, Reddish Egrets, Roseate Spoonbills, Brown Pelicans and other birds depend on the island's tidally influenced sand and mud flats, beaches and dunes. The Texas pocket gopher and keeled earless lizard can also be found here. This is an important staging area for migrating Peregrine Falcons (Nature Conservancy 2009).

South Padre Island has remained largely undeveloped throughout its history, serving primarily as ranchland. The first permanent settlement was located at the southern tip, in the current location of the city of South Padre Island. However, the island was not developed until the 1950s after the completion of the Queen Isabella Causeway. Intensive development has occurred over the past twenty years with most of the businesses related to the tourist trade. Moreover, oil and natural gas reserves were discovered beginning in the 1950's (USPS 2009).

Based on examination of 1977 and 2008 aerial photography, an estimated 899.8 acres (3.5 percent) of the RSA were developed in 1977, and an estimated 1,475.0 acres (5.7 percent) were developed in 2008. Approximately 239.5 acres of the 575.2 acres of development between 1977 and 2008 were threatened and endangered species habitat. There are currently 11 subdivisions totaling approximately 666.8 acres currently under development, of which an estimated 498.9 acres could be habitat. Therefore, approximately 8.4 percent of the RSA is developed or under development.

Threats to the island's ecology include increasing pressure and fragmentation from resort development, excessive off-road vehicle use, beach erosion, loss of native plant cover on dunes and declining water quality conditions in the adjacent Laguna Madre (Nature Conservancy 2009). The island's location in the northwestern Gulf of Mexico makes it subject to marine trash from shipping activity and other sources, brought in by the southeasterly prevailing winds. In 2005, approximately 153 tons of trash was removed from the beaches of Padre Island National Seashore, located north of the RSA (USPS 2009).

Shoreline erosion, caused by both natural and human actions, has resulted in loss of island wildlife habitat, potentially affecting island threatened and endangered species and rare species. South Padre Island Erosion rates average seven feet per year. Areas of residential and commercial development experience an accelerated rate of shoreline erosion (Texas Environmental Profiles 2009).

An example of a significant state habitat protection measure enacted in the RSA is the Dune Protection Act, which requires coastal counties to establish programs to protect dunes in their respective jurisdictions. An example of significant federal legislation protecting these habitats is the Coastal Barrier Resources Act, which established the Coastal Barrier Resources System and limited federal funding for development in these sensitive areas (Texas Environmental Profiles 2009).

Conservation areas established for mainland and Laguna Madre threatened and endangered species and rare species (**Sections 6.3.5 and 6.3.6.**) also emphasize conservation of Padre Island habitats and species. The USFWS's LANWR is the primary conservation landholding in the RSA. In 2003 to 2007, the Nature Conservancy conveyed about 24,500 acres to the USFWS for inclusion in the Refuge. The National Park Service's Padre Island National Seashore, located north of the RSA, also serves a central conservation role for Island threatened and endangered species and rare species. Refuge and Park lands preserve habitats for Kemp's ridley, loggerhead and green sea turtles, Peregrine Falcons, Piping Plovers, Brown Pelicans and numerous other threatened and endangered species and rare species (Nature Conservancy 2009).

The USFWS established extensive critical habitat for the Piping Plover on the island, including 19,096.2 acres in the RSA; 4,263.8 acres are located within LANWR while the remaining 14,832.4 acres occur outside the refuge. A critical habitat designation affects activities with federal involvement, such as federal funding or a federal permit. No other critical habitats occur in the RSA.

The TxDOT guidance on cumulative impacts analysis requires the NEPA practitioner to evaluate resources that are in poor or declining health or at risk, even if project impacts are minor.

6.3.7.4 Step 4: Direct and Indirect Impacts – Threatened and Endangered Species and State–Listed Rare Species - Island Habitats

The proposed project would have direct impacts ranging from 5.1 to 70.1 acres of potential threatened and endangered species and rare species-Island habitats in the RSA, depending on the build alternative (**Table 6-32**).

Table 6-32: Direct Habitat Impacts By Alternative

Alternative	Wetlands*	Dune Vegetation	Total (acres)
1	16.7	50.3	67
2	17.7	50.3	68
3	19.8	50.3	70.1
4	15.9	28.3	44.2
5	16.9	28.3	45.2
6	16.1	28.3	44.4
7	17.2	28.3	45.5
8	5.4	0.0	5.4
9	6.2	0.0	6.2
10	5.1	0.0	5.1
11	6.1	0.0	6.1

**Estuarine (on South Padre Island)*
Source: HNTB (2009)

According to *Proposed South Padre Island Second Access Project Economic Analysis*, an estimated 239.8 acres of induced development on South Padre Island could occur by 2045 as a result of the proposed 2nd Access Project above the No-Build Alternative (TXP, Inc. 2009). As a result, the proposed project could induce conversion of up to 239.8 acres of dune and wetland habitats, of which an estimated 33.1 acres would be threatened and endangered species habitat.

6.3.7.5 Step 5: Reasonably Foreseeable Actions – Threatened and Endangered Species and State–Listed Rare Species - Island Habitats

A total of 194 subdivisions totaling approximately 914.11 acres have been platted, with an average lot size of approximately 0.27 acres. Of these, 11 subdivisions totaling approximately 25.3 acres are slotted for future development (all parcels and platted lots vacant). Subdivision information for the RSA is listed in **Table 6-33**.

Table 6-33: Subdivisions in the Threatened and Endangered Species and Species of Concern – Island Habitats RSA

Subdivision Name	No. of Lots	Acreage
PADRE BEACH SUBDIVISION	1938	342.6
PADRE ISLAND UNSUBDIVIDED ABST 260	14	145.6
FIESTA ISLES SUBDIVISION	304	63.1
PADRE BEACH ESTATES SUBDIVISION	25	57.8
PADRE BEACH ACRES SUBDIVISION	3	13.7
SAIDA TOWERS 3 CONDOMINIUMS	1	13.0
THE VILLAS OF SOUTH PADRE SUBD	48	12.5
CONTRAN SUBDIVISION	2	12.2
MIRAMAR & SAND PILES SUBD LT 1,2,3	4	11.5
SUBDIVISIONS > 10 ACRES (9)	2,339	671.9
ALL SUBDIVISIONS < 10 ACRES (185)	542	242.2
TOTAL SUBDIVISIONS (194)	2,881	914.1

Source: Cameron County Appraisal District (2009)

Except for the proposed 2nd Access Project, there are no reasonably foreseeable Brownsville Metropolitan Planning Organization, Harlingen-San Benito Metropolitan Planning Organization, and TXDOT Statewide Transportation Improvement Program projects within the RSA boundary. However, according to *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009), an additional 222.7 acres of induced development beyond that induced by the proposed 2nd Access Project could occur within the RSA by 2045, as a result of full build-out of the other CCRMA roadway projects.

The LANWR Proposed Refuge Expansion Plan (1999) includes plans to acquire an additional approximately 13,921.1 acres within the RSA.[18]

6.3.7.6 Step 6: Cumulative Impacts Assessment – Threatened and Endangered Species and State–Listed Rare Species - Island Habitats

In this step, cumulative impacts are identified and the magnitude of those effects is evaluated. Development pressure and associated loss of habitat are the main threats to threatened and endangered species and rare species in the RSA; therefore, it is important to review relevant regulations related to development impacts to wetlands within the RSA.

The Endangered Species Act of 1973 provided for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife and plants depend. The Act authorizes the determination and listing of species, prohibits unauthorized taking, of endangered species, provides authority to acquire land for the conservation of listed species, encourages state-level programs for endangered and threatened wildlife and plant conservation, and authorizes criminal penalties for violating the Act.

In 1973 the Texas legislature authorized the TPWD to establish a list of endangered animals in the state. In 1988 the Texas legislature authorized the Department to establish a list of threatened and endangered plant species for the state. TPWD regulations prohibit the taking, possession, transportation, or sale of any of the animal species designated by state law as

[18] Estimate based on a geographic information system analysis of Expansion Plan information, geographic information system city limits data, and 2nd Access Proposed ROW. Area within city limits/extraterritorial jurisdictions and 2nd Access Proposed ROW were subtracted from mapped acquisition area.

endangered or threatened without the issuance of a permit. State laws and regulations prohibit commerce in threatened and endangered plants and the collection of listed plant species from public land without a permit issued by TPWD. Listing and recovery of endangered species in Texas is coordinated by the Wildlife Diversity Program.

In 1991, TPWD adopted state goals for protection of threatened and endangered species. These goals reflect the regulatory program of Endangered Species Act legislation that prohibits take of species unless authorized by a permit issued under Endangered Species Act.

The Coastal Barrier Resources Act of 1982 places restrictions on federal funding for development in coastal zones (USFWS 2009). The Act authorizes the Texas Coastal Management Program, which effectively limits development of island habitats. The Texas General Land Office is the lead agency for the Program, which identifies coastal natural resource areas and identifies uses or activities that may adversely affect those areas. The Coastal Coordination Council, which oversees the Program, has authority to review significant actions taken or authorized by state agencies and subdivisions that may adversely affect coastal natural resources. Among the policy provisions is one specifying no net loss of critical area functions and values. The Texas General Land Office also has authority under the Texas Dune Protection Act to prohibit certain dune habitats, potentially protecting listed species or rare species (Texas General Land Office 2009).

Analysis of data for subdivisions, roadway information and aerial photo interpretation indicates that approximately 575.2 acres has already been fully developed or is under development. The majority of this past development is high density residential and roadway land use. Another 4846.3 acres of conservation land is within LANWR or other public land holdings. Approximately 14,832.4 acres of designated critical habitat for the Piping Plover has been established in the RSA by the USFWS, outside the LANWR. While not a prohibition to development, a critical habitat designation necessitates consultation with the USFWS for any action with federal involvement such as funding or permitting (USFWS 2009).

The current action accounts for approximately 46.9 to 153.8 acres of ROW, depending on the build alternative (5.1 to 70.1 acres of habitat impacts depending on the alternative) within the RSA. A maximum of 239.8 acres of induced development could occur in the RSA from the proposed 2nd Access Project, of which approximately 33.1 acres could occur in threatened and endangered species habitat.

Reasonably foreseeable future actions include planned developments within the RSA. Planned subdivisions account for another approximately 25.3 acres. An estimated 13,921.1 acres of land, the entirety of which is potential dune or wetland habitat, and which also encompasses 11,714.9 acres of Piping Plover critical habitat, is proposed for acquisition for the LANWR (USFWS 1999).[19] An additional 222.7 acres of induced development could occur within the RSA as a result full build-out of the other CCRMA roadway projects, with an estimated potential for impacts to an additional 181.5 acres of habitat.

Refer to **Table 6-34** for a summary of the potential cumulative effect area within the RSA.

[19] Estimate based on a geographic information system analysis of Expansion Plan information, geographic information system city limits data, and 2nd Access Proposed ROW. Area within city limits/extraterritorial jurisdictions and 2nd Access Proposed ROW were subtracted from mapped acquisition area.

Table 6-34: Potential Cumulative Effect within the Threatened and Endangered Species and Species of Concern – Island Habitats RSA

Type of Action	Past Actions	Current Action*	Reasonably Foreseeable Actions	Cumulative Effect**
Development	899.8 acres development in 1977 1,475 acres of development in 2008 666.8 acres currently under development Total impacts to habitat between 1977 and 2008 = 239.5 acres Estimated impact to habitat from current development = 498.9 acres Total impact to habitat = 738.4 acres	Direct Impact - max 70.1 acres of habitat impacts Indirect Impacts – approx. 33.1 acres habitat Total impacts = 103.2 acres	25.3 acres subdivisions Max. 222.7 acres induced development from other CCRMA projects Estimated impact to habitat from future development = 185.6 acres Total impact = 248.0 acres	Total Cumulative Effect = 1,027.2 acres
Conservation	4846.3 acres of conservation land		Potential for addition of 13,921.1 acres to LANWR	18,767.4 acres of conservation land (all habitat***)
Ratio (D:C)****	-	-		1:18.3 (habitat)

Source: HNTB (2009)
* Assumes that subdivisions currently being developed will continue to develop prior to the letting date of the 2nd Access Project.
**Incorporates highest potential direct impact.
***mudflat, salt marsh, dune
****Ratio of Development acreage to Conservation acreage

6.3.7.7 Step 7: Results – Threatened and Endangered Species - Island Habitats

The threats described in recovery plans and other conservation documents were reviewed to understand the potential cumulative effect on threatened and endangered species in the RSA. Potential cumulative effects to which the current action could contribute includes inducement of development leading to disruption of dune and tidal flat habitats, for example potential development-related increases in nest predation to Piping Plover (USFWS 1996).

Habitat conversion to developed uses would be the most likely cause of impacts to Island threatened and endangered species and rare species in the RSA. Moreover, extensive areas of remaining available habitat occur on areas designated as critical habit, which is potentially developable (*Step 6*). Approximately 5.8 percent of the RSA has already developed in the past or is planned for development in the foreseeable future (including the current action).

However, extensive conservation lands exist in the RSA in LANWR, totaling 5,301.9 acres of dune, mudflat and sandflat habitats. Moreover, the designation of 14,832.4 acres of the RSA

outside LANWR as critical habitat would be expected to result in reduced development pressure on those lands.

The proposed project's impact to threatened and endangered species and rare species and their habitats would be minimized by design undertaken in consultation with the USFWS and TPWD and by compliance with federal and state laws. As a result, the proposed project would not substantially contribute to significant cumulative impacts to threatened and endangered species and rare species associated with Padre Island habitats. Because of the abundance of conservation lands in the RSA, as well as the no-take policy, the cumulative effect of development on Padre Island is expected to retain a large proportion of threatened and endangered species and rare species habitats within the RSA.

6.3.7.8 Step 8: Mitigation – Threatened and Endangered Species and State–Listed Rare Species - Island Habitats

It is anticipated that this development trend would continue as the region continues to grow. However, if development rates increase in intensity, habitat loss for island threatened and endangered species and rare species could occur over time. Thus, it becomes more crucial that habitat loss protections are strengthened where needed, fully implemented, and consistently enforced.

It is impossible to discuss island dune, sandflat and mudflat habitat loss without addressing mitigation measures and the foresight of agencies and conservation groups to mitigate these losses. Above in *Step 6* are descriptions of agency regulatory measures implemented throughout the RSA.

A number of initiatives have been undertaken within the RSA to conserve habitats for threatened and endangered species and rare species. This includes establishment of LANWR, including lands acquired for the refuge by the Nature Conservancy.

According to one study, a USFWS proposal of critical habitat designation results in a 20.5 percent decrease in the annual supply of housing permits in the short-run and a 32.6 percent decrease long-term (Zabel and Paterson 2005). Because of the preponderance of critical habitat in the RSA, reduced rates of development may occur, with associated mitigative benefits to the RSA's listed species. Furthermore, the USFWS has authority over actions affecting threatened and endangered species and may require restoration, creation, enhancement, or preservation of habitat features as compensation to offset unavoidable adverse impacts to the species. This means of compensatory mitigation is intended to comply with the general goals of the Endangered Species Act and the specific goal of de-listing.

The Texas General Land Office has announced upcoming projects to combat beach erosion, made possible by funding from the Texas Coastal Erosion Planning and Response Act. Measures include over $4.5 million in Act funds for beach renewal projects including a demonstration project that places low profile underwater stabilizers designed to slow future erosion rates (Texas General Land Office 2009). These efforts would have associated benefits to the habitats of some RSA listed species.

Reliance on regulatory programs to ensure future environmental protection does not provide complete protection of the regulated resource. Regulations are subject to violation, and not all losses of threatened and endangered species and rare species would be permitted or reported and not all violations would be discovered and pursued. There is some likelihood that take

could occur in conjunction with future development in the RSA. Impacts to potential habitats where no species occurrence is recorded need not be reported to the USFWS, so some loss of habitat is possible. Impacts which are compliant with the Endangered Species Act are anticipated to have minor impacts. Those which are non-compliant may result in unmitigated loss of habitat.

It is important to stress with regard to this project that CCRMA has been in ongoing consultation with the USFWS and TPWD throughout project development, and would coordinate the project with these agencies by sending copies of the South Padre Island 2nd Access Project draft environmental impact statement and final environmental impact statement documents for their review and comments. In addition, a Biological Evaluation (BE) would be prepared for consultation with the USFWS, TPWD, NMFS, and GLO. Wherever applicable, the determination of the appropriateness of mitigation and development of specific mitigation efforts would occur in coordination with TPWD, USFWS, CCRMA, TxDOT, and the USACE.

Piping Plover

The Piping Plover is a federally- and state-listed threatened species inhabiting estuarine wetland (mudflat and salt flat) and beach habitats of the Laguna Madre and South Padre Island. The USFWS lists it as endangered in parts of its range; however, those populations that occur in Texas are considered federally threatened. It is a winter migrant along the Texas Gulf Coast, and found on beaches and bayside mud and salt flats. The primary threat to the Piping Plover is development of their habitat, which includes commercial, residential and recreational expansion. Habitat loss is also associated with land subsidence and sea level rise, which impacts marsh vegetation, potentially converting marsh habitats to open water areas. Salt and brackish marshes on the Texas coast have experienced an 8.0 percent decline in salt marsh since the mid-1950s. Mud and salt flats have experienced even greater losses, decreasing 13.0 percent in the same period. Dredging for the Intracoastal Waterway is responsible for much of this loss, from site deposition of spoil materials (Moulton and Jacob 2003). In order to help revive the Piping Plover population, critical habitat has been designated by USFWS on the Gulf Coast and ranges from Florida to Texas. Designated critical habitat is shown in **Exhibits 6-5, 6-6, and 6-7**.

To summarize Piping Plover habitat and impacts within Laguna Madre and South Padre island habitats, incorporating information from **Sections 6.3.5 - 6.3.7**, an estimated 4,670 acres have been subdivided within approximately 52,003 acres of potential Piping Plover habitat. Approximately 37,386.4 acres of the 52,003 acres of habitat in the Laguna Madre and South Padre island vicinity are designated critical habitat. A maximum of 13.93 acres of Piping Plover critical habitat could be impacted by the proposed 2nd Access Project depending upon the alternative as well as acreage affected by underground utility relocation outside the proposed 2nd Access ROW, if required. Induced development from the 2nd Access Project could impact a maximum of 20.2 acres of suitable habitat for the Piping Plover. A total of 248 acres of plover habitat could be impacted by reasonably foreseeable development. An estimated 12,510.8 acres of critical habitat for Piping Plover occurs within the LANWR. Examination of aerial photography reveals an estimated 16,123.3 acres of critical habitat proposed for future acquisition for the LANWR[20]. As noted previously, however, project-induced development could help increase local land competition and drive up the price of land, making it increasingly unavailable for the USFWS to purchase.

[20] Estimate based on a geographic information system analysis of Expansion Plan information, geographic information system city limits data, and 2nd Access Proposed ROW. Area within city limits/extraterritorial jurisdictions and 2nd Access Proposed ROW were subtracted from mapped acquisition area.

The threats described in conservation documents were reviewed to understand the potential cumulative effect on the Piping Plover. Potential cumulative effects to which the current action could contribute include encroachment in and loss of estuarine wetland and island habitats, both direct effects of the proposed project. Potential cumulative effects to which the current action could contribute also include inducement of development with associated further loss of plover habitats.

Conservation lands in the vicinity of the Laguna Madre and on South Padre Island contain extensive amounts of Piping Plover habitat, including designated critical habitat (**Exhibits 6-5, 6-6, and 6-7**). A high proportion of additional lands proposed for acquisition by LANWR are also critical habitat. It should be noted that although the critical habitat designation is not a prohibition to development, it necessitates consultation with the USFWS for any action with federal involvement such as funding or permitting (USFWS 2009). According to one study, a USFWS proposal of critical habitat designation results in a 20.5 percent decrease in the annual supply of housing permits in the short-run and a 32.6 percent decrease long-term (Zabel and Paterson 2005).

The proposed project's impact to the Piping Plover and Piping Plover critical habitat would be minimized by design undertaken in consultation with the USFWS, TPWD and by compliance with federal and state laws. As a result, the proposed project would not be expected to substantially contribute to significant cumulative impacts to the Piping Plover or its habitats.

The cumulative impact of reasonably foreseeable future actions to the falcon within the RSA could be limited by floodplain development limitations (almost all habitat occurs within the 100-year floodplain) and by adherence to applicable USFWS and TPWD regulations.

For the above reasons, and because of the abundance of conservation lands in the vicinity of the Laguna Madre and South Padre island containing plover habitat, the cumulative effect of development is expected to be the retention of a large portion of suitable Piping Plover habitat. It should be noted; however, that this does not assure recovery of this species.

It is anticipated that the local development trend would continue as the region continues to grow. However, if development rates increase in intensity, habitat loss for Piping Plover could occur over time.

Habitat loss should be addressed concurrent with discussion of mitigation measures and the foresight of agencies and conservation groups to mitigate habitat losses. The Laguna Madre and South Padre island are very important to the recovery of the Piping Plover; the species spends more than 70% of the year on the wintering grounds, which includes the Texas coast, and an estimated 35% of the known population of Piping Plovers winters in Texas (TPWD).

Measures addressing wetland loss would have the corollary effect of mitigating plover habitat loss, since it is a wetland species. As discussed previously, there are USACE mitigative and regulatory measures associated with impacts to jurisdictional wetlands. An example of a private-public initiative serving to protect estuarine wetland Piping Plover habitat in the Laguna Madre is the Nature Conservancy's *Conservation Plan for the Texas Portion of the Laguna Madre* which evaluates conservation needs for Laguna Madre wildlife habitats including salt flats, mud flats and intertidal marshes.

The USFWS has authority over actions affecting threatened and endangered species; impacts which are compliant with the Endangered Species Act are anticipated to be minor. However,

reliance on regulatory programs to ensure future environmental protection does not provide complete protection of the regulated resource. Regulations are subject to violation, and not all impacts to Piping Plovers or critical habitat would be permitted or reported and not all violations would be discovered and pursued. Moreover, except for designated critical habitat, impacts to potential habitat where no occurrence is recorded need not be reported to the USFWS.

It is important to stress with regard to this project that CCRMA has been in ongoing consultation with the USFWS, TPWD, and the GLO throughout project development, and would coordinate the project with these agencies by sending them copies of the South Padre Island Proposed 2nd Access Project draft environmental impact statement and final environmental impact statement documents for their review and comments. In addition, a Biological Evaluation (BE) would be prepared for consultation with these agencies.

6.3.8 Rare Vegetation Series and Seagrass

6.3.8.1 Step 1: Resource Identification - Rare Vegetation and Seagrass

The following rare plant communities of concern are found in Cameron County, within the Rare Vegetation and Seagrass RSA (**Table 6-35**).

Table 6-35: Seagrass and Rare Plant Communities in the RSA

Plant Communities	Location	Status
Black Mangrove	Laguna Madre Estuarine Wetlands	Very rare, vulnerable to extirpation
Seacoast Bluestem-Gulfdune Paspalum Series	Padre Island Dunes	Rare
Texas Ebony-Snake-eyes Series	Thornscrub	Very rare, vulnerable to extirpation
Texas Ebony-Anacua Series	Mainland Resaca Riparian Areas	Extremely rare, very vulnerable to extirpation
Texas Ebony-Snake-eyes-berlandier Fiddlewood Series	Thornscrub	Very rare, vulnerable to extirpation
Texas Palmetto Series	Rio Grande Riparian	Extremely rare, very vulnerable to extirpation
Seagrass	Laguna Madre	Stable

Source: Texas Organization for Endangered Species (2009)

The Texas ebony communities are found within thorn-scrub areas of the mainland portion of the RSA, often isolated from other such communities through fragmentation due to development or farmland conversion. Areas of black mangrove are found in several locations within Laguna Madre estuarine wetlands. Areas of Seacoast Bluestem-Gulfdune Paspalum are found among the dunes of South Padre Island. Texas Palmetto is limited to Rio Grande riparian areas south of Brownsville on Audubon Society and Nature Conservancy conservation lands. Lastly, seagrass beds are found throughout the Laguna Madre. As urban sprawl and development and its indirect effects continue to occur throughout the Lower Rio Grande Valley, these plant communities become increasingly imperiled or subject to decline. Concern for loss of rare terrestrial and estuarine wetland vegetation series and the importance of the integrity of Laguna Madre seagrass beds for marine species, migratory birds and fisheries make analysis necessary.

6.3.8.2 Step 2: RSA – Rare Vegetation and Seagrass

The RSA for rare vegetation and seagrass is shown in **Exhibit 6-8**. It encompasses the same area as the surface water quality RSA (except the Gulf of Mexico), but also extends northward

to include South Padre Island and the lower Laguna Madre up to the Port Mansfield vicinity in Willacy County. The rare vegetation and seagrass RSA comprises 737,099 acres, of which 137,504 acres are protected, 32,990 acres are designated critical habitat, and 129,501.5 acres are the open waters of the Laguna Madre. Therefore, the developable RSA comprises approximately 437,103.5 acres.

6.3.8.3 Step 3: Resource Health and Historical Context – Rare Vegetation and Seagrass

Land use changes typically drive impacts to plant communities. As discussed in **Section 6.3.5.3,** most thorn-scrub brush and rangeland habitats have been converted to farmland and developed uses, with the result that only remnant areas of several native terrestrial plant communities remain. An estimated 95.0 percent of native habitat has been removed from the Lower Rio Grande Valley (USFWS 2009). Habitat in Brownsville is currently being lost at a rate of approximately 2.5 percent annually. If that trend continues, it is estimated that 50.0 percent of the habitat area in the Brownsville extraterritorial jurisdiction will be lost in the next 20 years (City of Brownsville 2009). Examination of aerial photography identifies approximately 168,754 acres of unprotected and potentially developable remaining shrub/scrub, rangeland, sand dune and wetland habitat in the RSA.

Based on examination of 1977 and 2008 aerial photography, an estimated 26,051.8 acres of the RSA were developed in 1977, and 70,226.0 acres were developed in 2008. Approximately 3,000.4 acres of potential rare vegetation habitat was impacted by the development between 1977 and 2008. Additionally, a total of 651 of the RSA's 1,709 subdivisions, totaling approximately 25,316.1 acres, are currently under development. Therefore, 95,542.1 acres of the RSA are developed or under development.

Hypersalinity, geographic, and climatic factors provide ideal conditions for seagrasses in the Laguna Madre (Nature Conservancy). However, impacts to the Laguna Madre associated with farming and development threaten native seagrass communities. Globally, seagrasses have been declining at a rate of 110 square kilometers per year since 1980 and the decline is accelerating at a rate of 7.0 percent per year (Waycott, et al. 2009). Seagrass coverage of the lower Laguna Madre decreased 31,122 acres (21%) from the mid-1960s to the mid-1970s (Onuf 2006[21]). Further decrease in Laguna Madre seagrass has been noted since the 1970s (TPWD 2009). In Texas, approximately 235,000 acres of seagrasses has been lost as of 1994 (TPWD 1999). The Laguna Madre contains approximately 118,600 acres of remaining seagrass, or 50.5 percent of all Texas coastal seagrass, comprised of five major seagrass species. The Nature Conservancy states that shoalgrass has decreased by 60.0 percent in 20 years, while totally de-vegetated areas have increased almost three-fold. Aside from overall seagrass loss, the species composition of seagrass beds has been affected, in part, by human activity. As noted above, shoal grass has declined precipitously in recent years. However, between the mid-1960s and 1998, manatee grass coverage doubled, while turtle grass coverage increased 25-fold in the lower Laguna Madre (Onuf 2009).

The Conservancy reports that seagrasses are also imperiled by boat propellers, which destroy plants and scar the Laguna Madre sediment, making it difficult for the plants to reestablish themselves. Texas bays and estuaries are crisscrossed by over 770 miles of federally maintained dredged channels and an unquantified number of private and commercial channels (Nature Conservancy 2009).

[21] Onuf, Christopher P., *Laguna Madre*. 2006 http://pubs.usgs.gov/sir/2006/5287/pdf/LagunaMadre.pdf

Most seagrass meadows in the Laguna Madre are state-owned. Texas Seagrass meadows in the Laguna Madre are still abundant but threatened, so the focus in this area is on protecting existing seagrass meadows. Dredging and filling activities have been widely recognized as one of the major anthropogenic disturbances contributing to the destruction of seagrass meadows, due to direct burial and from the disturbance of sediments and low dissolved oxygen caused by dredging operations. Excess non-point source nutrient pollutants in runoff are associated with algae blooms, such as 'brown tide' which are detrimental to seagrass beds. The most significant environmental impacts of dredged material disposal are related to the historic preference for use of partially confined or unconfined open-water disposal sites. Material placed in these sites typically disperses by mud flow or siltation during or immediately following the disposal operation, commonly beyond the authorized limits of the disposal site. Light reduction from maintenance dredging of the Gulf Intracoastal Waterway was the suspected cause of large-scale loss of seagrass cover in deep parts of the Laguna Madre between surveys conducted in 1965 and 1974 (TPWD 1999).

Development along shorelines may affect conditions of water depth and currents and cause loss of seagrasses. Artificial stabilization using bulkheads, rip-rap and other erosion control measures can contribute to deeper-water conditions near shore by inhibiting the natural development of a broad, shallow and gently-sloping bay margin profile. Such stabilization practices may alter local wave energy regimes, detrimentally affecting seagrass. Improperly designed, piers and overwater structures present special problems to seagrass habitats through surface light reduction, affecting underlying seagrass beds (TPWD 1999).

Numerous conservation areas have been established in recognition that historic removal of native vegetation through cattle ranching and agriculture, and more recent removal of native vegetation for development, has left a number of species in danger of extinction or extirpation. These areas are engaged in preservation and restoration of natural habitats, including thornscrub. These areas use various management techniques to promote growth of natural vegetation and enhancement of habitats for listed species, and conservation of rare vegetation series. Conservation areas in Cameron and Willacy Counties include the Laguna Atascosa and Lower Rio Grande Valley National Wildlife Refuges, established in 1946 and 1979, respectively. In addition, Las Palomas Wildlife Management Area was established in Cameron County in 1985. Altogether, National Wildlife Refuge and Wildlife Management Area holdings in the RSA total approximately 131,631.6 acres in the RSA. Lastly, the Nature Conservancy operates the 1,034-acre Lennox Foundation Southmost Preserve in southern Cameron County, while the Audubon Society also operates approximately 640 acres of preserves in Cameron County.

Less than 1.0 percent of Seacoast Bluestem-Gulfdune Paspalum and Texas Ebony-Anacua communities occur on state-owned conservation lands (TPWD 2007). Some of the few remaining remnant Texas Palmetto and Texas Ebony-Snake-Eyes communities occur on TPWD's South Bay Coastal Preserve (TPWD 2009), as well as the Audubon Society's Sabal Palm Grove Sanctuary and the Nature Conservancy's Lennox Southmost Preserve (Nature Conservancy 2009). Some of the few remaining remnant black mangrove communities occur within the Nature Conservancy's Laguna Madre Conservation Area (Nature Conservancy 2002) and the Texas General Land Office-owned South Bay Coastal Preserve, leased and managed by TPWD.

Additional protection to these communities is afforded on federal conservation lands such as LANWR.

Several Texas agencies have policies benefitting seagrass. The Texas General Land Office has jurisdiction over management of coastal submerged lands where seagrasses occur. The Texas General Land Office routinely considers potential seagrass impacts during its evaluation of proposed contracts with private, public and governmental entities. The Texas General Land Office's Texas Coastal Management Program can review coastal zone projects for impacts on seagrass resources if the impact exceeds established thresholds. The TCEQ enforces surface water quality standards, including Section 401 certification of Section 404 permits. The Texas State Soil and Water Conservation Board cooperates with TCEQ in nonpoint source pollution management, specifically in those situations associated with agricultural sources (TPWD 1999). The Seagrass Conservation Plan for Texas states that best management practices are needed to protect seagrasses, while allowing for development of coastal resources. The State's Wetland Conservation Plan presents the basis for initiation of a statewide seagrass conservation coordination effort, including provisions for freshwater inflow protection, navigational dredging and disposal planning and non-point source pollution prevention (TPWD 1999).

Because the TxDOT guidance on cumulative impacts analysis requires the NEPA practitioner to evaluate resources that are in poor or declining health or at risk (even if project impacts are minor), cumulative impacts to rare vegetation series and seagrass will be evaluated further.

6.3.8.4 Step 4: Direct and Indirect Impacts – Rare Vegetation and Seagrass

Direct impacts to the seagrasses from removal of plants during the construction and placement of bridge pilings would include 27.6 to 47.9 acres of seagrasses depending upon the alternative and any seagrass acreage affected by underground utility relocation outside the proposed 2nd Access ROW, if required. Indirect impacts would be greater, resulting from shading by the bridge structure; depending on the alternative, approximately 45.0 to 97.0 acres of seagrasses would be impacted by bridge shading (**Section 5.1.6.3**). Seagrasses could also be temporarily impacted by suspended sediments from project construction activities. Further indirect impacts to seagrasses could result from modification of currents in the Laguna Madre, and increased prop scarring of seagrass beds from improved access to portions of the Laguna Madre (**Chapter 5**).

Black mangroves occur along the Laguna Madre shoreline of South Padre Island; within the project area, sparse populations also occur along the mainland shoreline. The proposed project would impact up to 0.13 acre of black mangroves for all alternatives and any mangrove acreage affected by underground utility relocation outside the proposed 2nd Access ROW, if required. From 0 to 50.3 acres of Seacoast Bluestem-Gulfdune Paspalum vegetation would be impacted on the dunes and vegetated flats on South Padre Island, depending on alternative (**Table 6-36**).

Table 6-36: Potential Impacts By Alternative

Alternative	Seacoast Bluestem-Gulfdune Paspalum (acres)	Black mangrove (acres)	Seagrass (acres)*	Total
1	50.3	<0.1	83.6	133.9
2	50.3	<0.1	83.6	133.9
3	50.3	<0.1	66.4	116.7
4	28.3	<0.1	124.1	152.4
5	28.3	<0.1	124.1	152.4
6	28.3	<0.1	122.5	150.8
7	28.3	<0.1	122.5	150.8
8	0.0	<0.1	144.9	144.9
9	0.0	<0.1	144.9	144.9
10	0.0	<0.1	131.9	131.9
11	0.0	<0.1	131.9	131.9

**direct impacts from construction and shading impacts from bridge structure (direct and indirect impact)*
Source: HNTB (2009)

According to Proposed South Padre Island Second Access Project Economic Analysis, an estimated 402.1 acres of induced development (239.8 acres on South Padre Island and 162.3 acres on the mainland) could occur by 2045 as a result of the proposed 2nd Access Project above the No-Build Alternative (TXP, Inc. 2009). The increase in development into areas near the proposed landing for the bridge on SPI and to the north of the landing would likely lead to increased recreational boating in seagrass beds that have previously been fairly isolated from such impacts.

Potential impacts to Texas Ebony-Anacua in thorn-scrub areas, black mangroves in Laguna estuarine wetlands and Seacoast Bluestem-Gulfdune Paspalum on island dunes could also result. While the distributions of some of these vegetation communities is fairly well known (seagrass, mangrove), the occurrence of others is less well known (bluestem, Texas ebony-anacua), making quantification of potential impacts from induced development difficult. However, suitable habitat for these rare vegetation series occurs within approximately 22.9 percent of the RSA; therefore, induced development could potentially impact approximately 92.1 acres of suitable habitat for rare vegetation.

6.3.8.5 Step 5: Reasonably Foreseeable Actions – Rare Vegetation and Seagrass

In terms of subdivision and roadway development, the RSA mirrors the surface water quality RSA; therefore, reasonably foreseeable development activity for the Seagrass and Rare Vegetation RSA is identical to that for the water quality RSA. A total 173 subdivisions, totaling approximately 5,139.8 acres, are slotted for future development (all parcels and platted lots vacant). Subdivision information for the RSA is listed in **Table 6-8** (**Section 6.3.2.5**). Regarding impacts to seagrass, relevant subdivision development mirrors that listed in **Table 6-29** for the Threatened and Endangered Species – Laguna Madre RSA (**Section 6.3.6.5**).

Similarly, proposed roadway projects for the RSA are identical to those for the surface water quality RSA (**Table 6-9, Section 6.3.2.5**). To summarize, approximately 45 roadway improvement projects are foreseeable in the RSA. An estimated 1,025 acres of undeveloped thorn-scrub brush and other areas potentially harboring rare vegetation is encompassed within proposed ROWs for these projects. **Table 6-9** lists proposed transportation projects, excluding the proposed project, and associated ROW.

For seagrass, except for the proposed 2nd Access Project, there are no reasonably foreseeable Brownsville Metropolitan Planning Organization, Harlingen-San Benito Metropolitan Planning

Organization and TXDOT Statewide Transportation Improvement Program projects within the RSA boundary. According to *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009), an additional 397.0 acres of induced development, beyond that induced by the proposed 2nd Access Project, could occur by 2045, as a result of full build-out of the other CCRMA roadway projects. It should be noted this projection for induced development only accounts for the effect of CCRMA Plan roadways. Additional induced development in the RSA could result from full build-out of Brownsville and Harlingen-San Benito Metropolitan Planning Organization and TxDOT Surface Transportation Improvement Plan Project roadways as listed in **Table 6-9** (**Section 6.3.2.5**).

The LANWR Proposed Refuge Expansion Plan (USFWS 1999) includes plans to acquire an additional approximately 126,033.8 acres within the RSA.[22]

6.3.8.6 Step 6: Cumulative Impacts Assessment – Rare Vegetation and Seagrass

In this step, cumulative impacts are identified and the magnitude of those effects is evaluated.

Development pressure and associated loss of habitat are the main threats to rare vegetation series and seagrass in the RSA; therefore, it is important to review relevant regulations related to development impacts to wetlands within the RSA.

Texas agency regulatory oversight affecting seagrass, as discussed in *Step 3*, consists of measures governing surface water quality inputs into the Laguna Madre, administered by the TCEQ, and activities directly affecting seagrass beds, administered by the Texas General Land Office.

To the extent that seagrass, Seacoast Bluestem-Gulfdune Paspalum Series, Texas ebony-anacua, or black mangrove occurrence is on protected areas, these vegetation communities indirectly benefit from the Endangered Species Act, which provides for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife and plants depend. The Act provides authority to acquire land for the conservation of listed species, encourages state-level programs for endangered and threatened wildlife and plant conservation, and authorizes criminal penalties for violating the Act.

The Coastal Barrier Resources Act of 1982 places restrictions on federal funding for development in coastal zones (USFWS 2009). The Act authorizes the Texas Coastal Management Program, which effectively limits development of island habitats. The Texas General Land Office is the lead agency for the Program, which identifies coastal natural resource areas and identifies uses or activities that may adversely affect those areas. The Coastal Coordination Council, which oversees the Program, has authority to review significant actions taken or authorized by state agencies and subdivisions that may adversely affect coastal natural resources. Among the policy provisions is one specifying no net loss of critical area functions and values. The Texas General Land Office also has authority under the Texas Dune Protection Act to protect certain dune habitats, potentially protecting listed species or rare species (Texas General Land Office 2009). The Texas General Land Office also has jurisdiction over the state-owned submerged lands, which is the area from mean high tide along the Gulf beach or bay-estuary shoreline to 10.36 miles offshore in the Gulf.

[22] Estimate based on a geographic information system analysis of Expansion Plan information, geographic information system city limits data, and 2nd Access Proposed ROW. Area within city limits/extraterritorial jurisdictions and 2nd Access Proposed ROW were subtracted from mapped acquisition area.

Analysis of data for subdivisions, roadway information, and aerial photo interpretation indicates that approximately 13.0 percent of the study area (95,542.1 acres) has already been fully developed or is under development. The majority of this past development is roadway and low density, suburban residential land use. Another 18.7 percent (137,504 acres) of the land, almost entirely thorn-scrub shrub, rangeland, or wetland habitat (potentially containing rare vegetation series) was preserved either fee simple or through conservation easements as parks, preserves, or conservation lands. Another 32,990 acres have been designated critical habitat for the Piping Plover by the USFWS. While not a prohibition to development, a critical habitat designation necessitates consultation with the USFWS for any action with federal involvement such as funding or permitting (USFWS 2009). For seagrass, conservation land holdings in the RSA are limited to the Laguna Madre land/water boundaries of conservation lands, primarily the LANWR, which also affords some protection from unregulated Laguna Madre access. However, as waters of the state and U.S., the entirety of open water of the RSA is protected from unregulated impacts through the provisions of the Clean Water Act. In summary, the entirety of the 129,501.5 acres of open water in the RSA is effectively conservation land, largely restricted from development or other disturbance.

The current action accounts for approximately 0.06 percent of additional development (approximately 287.0 to 466.9 acres, depending on the build alternative) within the RSA – an increase of 1.3 percent over existing conditions. Maximum impacts to rare vegetation would be 50.3 acres. In addition, a maximum of approximately 402.1 acres of induced development could occur from the proposed 2nd Access Project, of which approximately 92.1 acres could occur within suitable habitat for rare vegetation.

Reasonably foreseeable future actions include developments planned and platted within the RSA. These future actions account for another approximately 5,139.8 acres. An additional 397.0 acres of induced development could occur as a result full build-out of the other CCRMA roadway projects. Total impacts to suitable habitat for rare vegetation are estimated at 3,760.5 acres. An estimated 126,033.8 acres of land, encompassing approximately 81,952.3 acres of habitat including thorn-scrub and rangeland potentially harboring terrestrial rare vegetation, and wetland and open water habitat potentially harboring wetland rare vegetation, as well as 25,080.3 acres of Piping Plover critical habitat, is proposed for acquisition for the LANWR (USFWS 1999).[23]

To summarize, 1,709 subdivisions totaling approximately 46,582.8 acres within the RSA have been subdivided. These areas encompass approximately 16,633.5 acres of thorn-scrub, grassland, riparian, dune and wetland habitat – areas which could harbor a rare vegetation series. Moreover, an estimated 3,511.6 acres of these habitats occur within existing and proposed roadway ROWs. A maximum of 70.1 acres of estuarine wetland and dune vegetation, potential habitat for rare vegetation series Black Mangrove or Seacoast Bluestem-Gulfdune Paspalum, would be impacted by the proposed 2nd Access Project. A maximum of approximately 75.4 acres of bridge (on structure), causing shading impacts to a maximum of 97.0 acres of Laguna Madre seagrass, could result from the proposed project. Although unlikely, it can be conservatively estimated that the entirety of development induced by full build-out of CCRMA Plan roadways, including 2nd Access (maximum of approximately 825.9 acres) could harbor a rare vegetation series.

[23] Estimate based on a geographic information system analysis of Expansion Plan information, geographic information system city limits data, and 2nd Access Proposed ROW. Area within city limits/extraterritorial jurisdictions and 2nd Access Proposed ROW were subtracted from mapped acquisition area.

See **Table 6-37** for a summary of the potential cumulative effect area within the RSA, for rare vegetation series and for Laguna Madre Seagrass.

Table 6-37: Potential Cumulative Effect Area within the Rare Vegetation Series and Seagrass RSA

Type of Action	Past Actions	Current Action*	Reasonably Foreseeable Actions	Cumulative Effect***
Development[A]	26,051.8 acres developed in 1977 70,226.0 acres developed in 2008 25,316.1 acres currently under development Impact to habitat between 1977 and 2008 = 3,000.4 acres Estimated impact to rare vegetation from current development = 12,507.8 acres Total Impact = 15,508.2 acres	Direct Impact - Max. 50.3 acres; Indirect Impact – approx. 92.1 acres of induced development Total Impact = 142.4 acres	5,139.8 acres planned development Max. 397.0 acres induced development from other CCRMA projects 2,491.0 acres of roads Total Impact = 8,027.8 acres Total impact to suitable habitat for rare vegetation = 4,991.3 acres	Total Cumulative Effect = 20,641.9 acres
	Seagrass: 6,310.9 acres of subdivisions; 41.4 acres of roads	Direct Impact – 21.40–47.94 acres. 67.5–75.4 acres of bridge footprint (on structure) with associated indirect impact (shading) to 45.0–97.0 acres Total Impact = 144.9	Seagrass: 1,311.2 acres of subdivisions; 0.0 acres of roads	Seagrass: 7,735.0 acres of development
Conservation	Rare Vegetation Series: 137,504 acres of conservation land (parks, preserves)	-	Potential for addition of 126,033.8 acres to LANWR	Rare Vegetation Series: 263,537.8 acres of conservation land (195,149.5acres of habitat****)
	Seagrass: 129,501.5 acres of conservation land**	-	-	Seagrass: 129,501.5 acres of conservation land (open water of Laguna Madre, South Bay, Brownsville Ship Channel)
Ratio (D:C)*****	-	-	-	Rare Vegetation Series - 1:12.9 Seagrass -1:16. 7

Source: HNTB (2009)
[A]Seagrass data from **Table 6-35**
* Assumes that subdivisions currently being developed will continue to develop prior to the letting date of the 2nd Access Project.
**Incorporates highest potential direct impact.
***Incorporates the mean of highest and lowest Current Action alternative proposed ROW (377.0 acres) for rare vegetation series; and mean of highest and lowest Current Action bridge footprint (on structure) over Laguna Madre (71.5 acres) for seagrass-only

****Thorn-scrub shrub, rangeland, wetlands
*****Ratio of Development acreage to Conservation acreage

6.3.8.7 Step 7: Results – Rare Vegetation and Seagrass

The threats described in conservation documents were reviewed to understand the potential cumulative effect on rare vegetation series and seagrass in the RSA (*Step 3*). Potential cumulative effects to which the current action could contribute include direct take of these communities, as well as impacts to seagrass including shading impacts from the proposed 2nd Access Project, sediment impacts due to turbidity generated by 2nd Access Project construction activity, and contaminants found in stormwater runoff or hazardous material spills originating from the roadway.

Habitat conversion to developed uses would be the most likely cause of impacts to Seacoast Bluestem-Gulfdune Paspalum, Texas Ebony-Anacua, black mangrove, or other rare vegetation communities in the RSA. Approximately 7.5 percent of the RSA has already developed in the past or is planned for development in the foreseeable future (including the current action).

Habitat quality deterioration from physical disturbance and degraded water quality would be the most likely cause of impacts to Laguna Madre seagrass beds. Water quality degradation would result from sediment and pollutant inputs due to runoff from agricultural lands, conversion of neighboring lands to developed uses and dredging activity. Dredging or construction activity such as bridge placement could result in direct disturbance of seagrass. Ongoing disturbance could be manifest as propeller scarring of seagrass due to increased boating, a likely result of induced development.

Extensive conservation lands potentially harboring rare vegetation series exist in the RSA. While extensive areas harboring or potentially harboring these resources are located outside conservation areas and would therefore be considered potentially developable (Step 3), a high proportion occurs within 100-year floodplains, limiting actual development potential. It should be noted that development nevertheless occurs within floodplains. Numerous Cameron County colonias, many established in floodplain areas, are recipients of ongoing local, federal and state funding to upgrade deficient infrastructure such as water and wastewater services or roads. As discussed in *Step 6,* seagrass is harbored in extensive open water areas of the Laguna Madre, which effectively serve as conservation lands.

The intent of Section 404 of the Clean Water Act is to protect the nation's waters from the indiscriminate discharge of material capable of causing pollution, and to restore and maintain their chemical, physical and biological integrity. Any discharge into waters of the U.S. must be in accordance with Section 404(b)(1) guidelines developed by the EPA in conjunction with the USACE. In the Section 404 permit process, permit applications are reviewed by the USACE for compliance with Section 401 of the Clean Water Act. It is recognized, however, that these measures do not fully safeguard surface water quality, including resident resources such as seagrass. This is evidenced, for example, by algal blooms which often occur near areas of shoreline development. In summary, while the proposed project's indirect impact (induced development) to Laguna Madre water quality and associated effects to seagrass would be minimized through these measures, it would not be prevented altogether.

The proposed project's impact to rare vegetation series and seagrass would be minimized by design undertaken in consultation with the USFWS and TPWD and by compliance with federal and state laws. As a result, the proposed project would not substantially contribute to significant

cumulative impacts to these resources in the RSA. Because of the abundance of conservation lands in the RSA, the cumulative effect of RSA development is expected to retain a large proportion of existing rare vegetation series and seagrass in the RSA.

Habitat impacts and countervailing conservation efforts in the RSA are extensive. The potential for conserving rare vegetation series and seagrass is good due to the extent of conservation lands in the RSA.

6.3.8.8 Step 8: Mitigation – Rare Vegetation and Seagrass

It is anticipated that this development trend would continue as the region continues to grow. However, if development rates increase in intensity, loss of rare vegetation series and seagrass beds could occur over time. Thus, it becomes more crucial that habitat loss protections are strengthened where needed, fully implemented and consistently enforced. Boat propeller scarring of seagrass would impede any seagrass restoration (mitigation) efforts in the project area following construction. Mitigation would instead be pursued off-site.

It is impossible to discuss loss of these resources without addressing mitigation measures and the foresight of agencies and conservation groups to mitigate these losses. Above in Step 3 and Step 6 are descriptions of regulatory and conservation measures implemented in the RSA.

As discussed previously, most seagrass meadows in the Laguna Madre are state-owned. In addition, a number of initiatives have been undertaken within the RSA to conserve habitats for threatened and endangered species and rare species, including areas of Seacoast Bluestem-Gulfdune Paspalum Series, Texas Ebony-Anacua and black mangrove. These initiatives include establishment of three national wildlife refuges (Laguna Atascosa, Santa Ana, Lower Rio Grande Valley), two state wildlife management areas (Las Palomas, Arroyo Colorado), two state parks (Boca Chica, Resaca de la Palma) Sabal Palm Audubon Sanctuary (Audubon Society) and Lennox Foundation Southmost Preserve (Nature Conservancy). The City of Brownsville Comprehensive Plan (2009) recommends measures to promote preservation of dense regions of tree coverage, and in particular preservation of urban resacas. These areas have the potential to contain rare vegetation series.

Examples of other private or non-regulatory initiatives aimed at preserving seagrass includes a Nature Conservancy-led initiative to encourage boaters to use voluntary marked boat lanes in portions of the Laguna Madre (Nature Conservancy 2009) and promotion of non-regulatory water quality management activities through watershed management programs, as presented in TPWD's Seagrass Conservation Plan. In the Plan, it is acknowledged that practices are needed to protect seagrasses while allowing for development of coastal resources.

In accordance with Provision (4)(A)(ii) of the TxDOT/TPWD Memorandum of Understanding (TxDOT and TPWD 1998) the TxDOT/TPWD Memorandum of Agreement identifies non-regulatory habitats that TxDOT would consider mitigating should the project impact the habitats. These habitats include any habitat for federal candidate species if mitigation would prevent the listing of the species; S3 rare vegetation series that provide habitat for state listed species; S1 and S2 rare vegetation series; native prairies and riparian sites; and any other habitat feature considered to be locally important.

Reliance on regulatory programs to ensure future environmental protection does not provide complete protection of the resource. For example, it is likely that rare vegetation impacts would occur on some of the remaining approximately 255,070 acres of developable land in the RSA

(not in the 100-year floodplain). Similarly, there is a likelihood that minor Section 404 regulatory infractions would occur in conjunction with future development, resulting in limited unpermitted and unmitigated impacts to surface water quality with associated impacts to Laguna Madre water quality and, therefore, seagrass. Depending on the Nationwide Permit an activity is being covered under (e.g. Nationwide Permit 14 - Linear Transportation Crossings), impacts to surface waters (excluding wetlands and other special aquatic sites) which are less than one-tenth of an acre need not be reported to the USACE; however, those which are compliant with Clean Water Act regulations are anticipated to have minor water quality impacts.

It is important to stress with regard to this project that all impacts to rare vegetation series and seagrass associated with this project would be mitigated in compliance with all applicable regulatory standards. The CCRMA would coordinate the project with TCEQ and TPWD by sending copies of the South Padre Island 2nd Access Project draft environmental impact statement and final environmental impact statement documents for their review and comments regarding impacts to these resources.

6.3.9 Essential Fish Habitat

6.3.9.1 Step 1: Resource Identification - Essential Fish Habitat

The resource is the Laguna Madre, South Bay, the Gulf of Mexico and associated waters all of which are designated essential fish habitat. Essential fish habitat is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", as designated by the National Oceanic and Atmospheric Administration Marine Fisheries Service (NOAA Fisheries) and Gulf of Mexico Fisheries Management Council. These include all Gulf of Mexico estuarine and marine waters and substrates. The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) as amended, mandates the identification of essential fish habitat for managed species, as well as measures to conserve and enhance the habitat necessary for fish to carry out their life cycles. Fishery Management Plans have been prepared for shrimp and redfish, both of which occur in the Laguna Madre. Other managed species in the Laguna Madre important as sport fish include black drum, speckled sea trout and flounder.

6.3.9.2 Step 2: RSA – Essential Fish Habitat

The RSA for essential fish habitat mirrors that for Threatened and Endangered Species and Rare species for the Laguna Madre; however, it does not include the open waters of the Gulf of Mexico. The RSA is shown in **Exhibit 6-9**. The essential fish habitat RSA comprises 137,446 acres.

6.3.9.3 Step 3: Resource Health and Historical Context – Essential Fish Habitat

The Laguna Madre is one of three biologically productive hyper saline lagoons in the world, providing more than half of the total Texas yearly fish catch (Nature Conservancy 2009).

Seagrass is the foundation for commercially and recreationally important fisheries in the Laguna Madre and Gulf of Mexico. Underwater seagrass meadows serve as nursery and foraging habitat for shrimp, redfish, speckled sea trout and other species (Nature Conservancy 2009). The clear shallow waters of in the Laguna Madre are ideal for seagrass growth; approximately 80.0 percent of the remaining seagrass habitat in Texas is located in the Laguna Madre. With large ranches along much of the west shore and Padre Island National Seashore along much of the east shore, much of the Laguna Madre remains in pristine condition (TPWD 2009).

However, various activities on land and in the water constantly threaten to alter, damage, or destroy these habitats. Decrease in Laguna Madre seagrass has been noted since the 1970s (TPWD 2009). In Texas, approximately 235,000 acres of seagrasses has been lost as of 1994 (TPWD 1999). An example of effects of excessive nutrient inputs is brown tide, an algal bloom that persisted in varying degrees of severity throughout the Laguna Madre in the 1990's and has been reported more recently. Brown tide is detrimental to seagrass growth because it reduces light penetration and photosynthesis, eventually resulting in loss of seagrass habitat (TPWD 2009).

Several Texas agencies have policies benefitting seagrass, including the Texas General Land Office, which has jurisdiction over management of coastal submerged lands where seagrasses occur, the TCEQ, which enforces surface water quality standards and associated inputs into the Laguna Madre, and TPWD, which administers the Seagrass Conservation Plan for Texas (TPWD 1999). Refer to **Section 6.3.8** for a further discussion of Laguna Madre seagrass status and conservation efforts.

Conservation areas have also been established adjacent to the Laguna Madre, affording some protection to Laguna Madre essential fish habitat from uncontrolled access and development. These include Padre Island National Seashore, located immediately north of the RSA on South Padre Island and LANWR, which includes over 30 miles of Laguna Madre, South Bay and Brownsville Ship Channel shoreline.

NOAA Fisheries developed a consultation process for addressing potential adverse impacts to essential fish habitat from actions with any form of federal involvement such as funding or permitting; there is no consultation authority for private-sector actions without federal involvement.

This consultation process, authorized by the Magnuson-Stevens Act, protects the quality of the aquatic environment needed for fish resources. During consultation, NOAA Fisheries may comment on concerns about the negative impact the activity will have on the environment and suggesting measures to reduce the impact. The Coastal Zone Management Act helps protect essential fish habitat by helping states regulate activities in the coastal zone. Under this act, states submit Coastal Zone Management Program Plans for federal approval. Texas has an approved coastal management program.

Because the TxDOT guidance on cumulative impacts analysis requires the NEPA practitioner to evaluate resources that are in poor or declining health or at risk (even if project impacts are minor), cumulative impacts to essential fish habitat will be evaluated further.

RSA essential fish habitat is within the management areas of the red drum, shrimp, reef fish, stone crab, and coastal migratory pelagic Fishery Management Plans (FMP) (**Section 3.7.3.5**), discussed below.

Red Drum

This important sportfish and commercial species occupies estuarine habitats of the Laguna Madre from larval to late juvenile life stages, where they are heavily dependent on seagrass bed habitat. Adults mostly inhabit offshore areas, where they feed on crab, shrimp, and fish. While much of the Laguna Madre seagrass habitat is intact, these have been modified and impacted by anthropogenic development-related effects (**Section 6.3.8**). The Texas red drum population declined dramatically beginning in the 1970s. In response to a TPWD recovery plan utilizing

fishing restrictions and a restocking strategy to supplement natural recruitment, the red drum population in Texas coastal waters has rebounded (TPWD[24]).

Shrimp

Texas waters produce about one-third of the annual U.S. Gulf of Mexico harvest[25]. Brown, white, and pink shrimp species comprise almost the entirety of the Texas commercial shrimp crop, with brown shrimp comprising most of the annual catch. Post-larvae and juveniles enter Laguna Madre estuaries from open gulf waters in the spring, where they feed on benthic algae, polychaete worms, crustaceans, and detritus. While the total annual catch varies according to yearly estuarine conditions (salinities, temperature, tidal heights in marshes) affecting recruitment, there has been a significant trend towards decreasing size and age of brown shrimp since 1959[27].

Stone Crab

The gulf stone crab is found in Laguna Madre waters throughout its life history. Adults feed on oysters, acorn barnacles, mollusks, and crustaceans. Overharvest is prevented by limiting take to removal of one of the of the two large pincher claws with removal of the live crab to the water, where the removed claw is regenerated. Stone crab population levels are estimated to be high and no overfishing is occurring (NMFS[28]).

Reef Fish

Forty-four species of reef fish are associated with Laguna Madre estuarine habitats, including 14 species of snapper (including Red Snapper) and 14 species of grouper. Reef fish are found within the Laguna Madre during juvenile life stages where they find suitable prey species. While reef fish move offshore as adults, estuary-dependent prey species remain an important component of their diet. The Reef Fish FMP was implemented in 1984, in response to declining reef fish populations. Measures specified in the FMP primarily dealt with recreational and commercial fishing limits. The Plan is regularly amended in response to changing reef fish populations.

Coastal Migratory Pelagics

King and Spanish mackerel and Cobia comprise this group of important sport and commercial fish. While these species are primarily fish of open gulf waters, the Laguna provides vital habitat for most of their prey species. As a result, coastal pelagic species are dependent on the quality of Laguna Madre estuarine habitats.

6.3.9.4 Step 4: Direct and Indirect Impacts – Essential Fish Habitat

Permanent direct impacts to essential fish habitat would be due to seagrass removal (**Section 6.3.8.4**) and benthic habitat loss in conjunction with bay crossing bridge pier placement and any seagrass or other benthic areas affected by underground utility relocation outside the proposed 2nd Access ROW, if required. Increased suspended sediments due to construction activities would also represent potential direct impacts to seagrass and, by association, essential fish habitat.

[24] Texas Parks and Wildlife Department. *Successful Enhancement of the Texas Red Drum (Sciaenops ocellatus) Population. Available online at* http://www.lib.noaa.gov/retiredsites/japan/aquaculture/report22/mceachro.html
[25] Texas Parks and Wildlife Department. *Executive Summary, The Texas Shrimp Fishery*. September 2002 http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_rp_v3400_857.pdf
[27] NOAA. *Forecast for the 2011 Brown Shrimp Season in the Western Gulf of Mexico, from the Mississippi River to the U.S.-Mexico Border*..June 28, 2011. http://galveston.ssp.nmfs.gov/news/2011Forecast/Forecast2011.pdf
[28] NMFS. *FishWatch – U.S. Seafood Facts*. http://www.nmfs.noaa.gov/fishwatch/species/stone_crab.htm

Indirect impacts to seagrass and essential fish habitat would be more extensive, resulting from shading by the new bridge structure; depending on the alternative, approximately 45.0 to 97.0 acres of essential fish habitat seagrass beds would be subject to shading impacts (**Table 6-36, Section 6.3.8.4**). Moreover, the added structural component offered by the bridge structure could have an indirect impact by altering the fishery community by providing a hard substrate not currently provided in the project area. In addition, the shading provided by the bridge could alter the behavior and composition of the fishery community in the bridge vicinity.

No permanent best management practices are proposed for the Laguna Madre crossing component of the project. This would result in an increase in impervious cover and greater volumes of runoff with roadway pollutants affecting the Laguna Madre during storm events. Additionally, accidental spills on the causeway could result in contaminants introduced to the Laguna Madre, potentially affecting essential fish habitat health.

Because undeveloped portions of the RSA consist largely of open water areas, there is little opportunity for induced development within the RSA boundary. However, according to the *Proposed South Padre Island Second Access Project Economic Analysis*, the proposed project could induce up to 402.1 acres of development adjacent to the RSA, on the mainland, and on South Padre Island (TXP, Inc. 2009). Development-related addition of impervious cover near the RSA could affect quality of runoff entering the RSA, potentially affecting Laguna Madre essential fish habitat. However, these threats would be minimized by engineered water quality controls, which would be anticipated to be implemented in conjunction with subdivision or roadway development. The TCEQ requires temporary and permanent best management practices designed to assure that unacceptable impacts to water quality are avoided, both from construction activity and from developed areas. As a result, these indirect effects would not be anticipated to be significant.

6.3.9.5 Step 5: Reasonably Foreseeable Actions – Essential Fish Habitat

The RSA boundary mirrors the Threatened and Endangered Species – Laguna Madre RSA; therefore, reasonably foreseeable development activity for the current RSA is identical to that for that RSA (**Table 6-29, Section 6.3.6.5**). Except for the proposed 2nd Access Project, there are no reasonably foreseeable Brownsville Metropolitan Planning Organization, Harlingen-San Benito Metropolitan Planning Organization and TXDOT Statewide Transportation Improvement Program projects within the RSA boundary. According to *Proposed South Padre Island Second Access Project Economic Analysis* (TXP, Inc. 2009), an additional 397.0 acres of induced development beyond that induced by the 2nd Access Project could occur adjacent to the RSA by 2045, as a result of full build-out of the other CCRMA roadway projects.

6.3.9.6 Step 6: Cumulative Impacts Assessment – Essential Fish Habitat

In this step, cumulative impacts are identified and the magnitude of those effects is evaluated. Development pressure and associated loss of habitat are the main threats to seagrass beds, and therefore essential fish habitat and an important component of FMP management areas, in the RSA.

Texas agency regulatory oversight directly affecting seagrass and indirectly affecting essential fish habitat, as discussed in *Step 3***,** consists of measures governing surface water quality inputs into the Laguna Madre, administered by the TCEQ, and activities directly affecting seagrass beds, administered by the Texas General Land Office.

Analysis of data for subdivisions, roadway information and aerial photo interpretation indicates that approximately 6,352.0 acres has already been fully developed. The majority of this past development is high density residential and roadway land use. Approximately 5,080.6 acres of the RSA has been designated critical habitat for the Piping Plover by the USFWS. While not a prohibition to development, a critical habitat designation necessitates consultation with the USFWS for any action with federal involvement such as funding or permitting (USFWS 2009). Because the RSA consists primarily of open waters of the Laguna Madre and Gulf of Mexico, fee simple, conservation easement, preserves, or other conservation land holdings in the RSA are limited to the Laguna Madre spoil islands and land/water boundaries of conservation lands, primarily the LANWR, which also affords some protection from unregulated Laguna Madre access. However, as waters of the state and U.S., the entirety of open water of the RSA is protected from regulated impacts through the provisions of the Clean Water Act as well as NOAA Fisheries and Texas General Land Office policies. In summary, approximately 129,501.5 acres of the RSA's open water, or approximately 94.2 percent of the RSA, is effectively conservation land, largely restricted from development or other disturbance.

The current action accounts for approximately 67.5 to 75.4 acres of additional development (depending on the build alternative) within the RSA. In addition, a maximum of 402.1 acres of induced development immediately adjacent to the RSA could occur from the proposed 2nd Access Project (TXP, Inc. 2009), with associated potential water quality effects to essential fish habitat of the Laguna Madre.

Reasonably foreseeable future actions include planned developments currently underway, as well as those planned and platted within the RSA. Planned current/future subdivisions account for another approximately 1,311.2 acres of the RSA. While there is little opportunity for induced development within the RSA boundary, according to *Proposed South Padre Island Second Access Project Economic Analysis*, an additional 397.0 acres of induced development beyond that induced by the 2nd Access Project could occur by 2045, as a result of full build-out of the other CCRMA roadway projects.

In summary, 38 subdivisions totaling approximately 7,622.1 acres within the RSA have been subdivided, with an average lot size of approximately 0.82 acres. Of these, 18 subdivisions totaling approximately 1,239.9 acres are currently at some level of development (some vacant parcels remain) and 6 subdivisions totaling approximately 71.3 acres slotted for future development (all parcels and platted lots vacant). Subdivision information for the RSA is listed in **Table 6-38**. Because the remainder of the RSA is largely open water, little or no opportunity for induced development exists within the RSA boundary; however, up to 825.9 acres of induced development could occur by 2045 adjacent to the RSA in response to full build-out of the CCRMA plan roadways, including the 2nd Access Project. This development has the potential to affect Laguna Madre water quality, with associated effects to essential fish habitat. Refer to **Table 6-38** for a summary of the potential cumulative effect area within the RSA.

Table 6-38: Potential Cumulative Effect Area within the Essential Fish Habitat RSA

Type of Action	Past/Present Actions	Current Action	Reasonably Foreseeable Actions	Cumulative Effect*
Development	No development within RSA	Direct Impact – max. 43.9 acres Indirect Impact – max. 97.0 acres shading impacts to seagrass from 67.5–75.4 acres of bridge footprint (on structure) Total Impact = 140.9 acres	7,622.1 acres of subdivisions, but not within RSA	Total Cumulative Effect = 140.9 acres
Conservation	129,501.5 acres of conservation land**	-	-	129,501.5 acres of conservation land**
Ratio (D:C)***	-	-	-	1:16. 7

Source: HNTB (2009)
*Although the amount of development can be calculated, the total impacts to individual resources cannot be known. Therefore, the cumulative effect is based on the current action and reasonably foreseeable actions.
**Incorporates highest potential direct impact.
***Ratio of Development acreage to Conservation acreage

6.3.9.7 Step 7: Results – Essential Fish Habitat

The threats described in conservation documents were reviewed to understand the potential cumulative effect on essential fish habitat in the RSA (*Step 3*), including effects to species with FMP-designated management areas encompassing RSA essential fish habitat. Potential cumulative impacts to which the current action could contribute include removal of essential fish habitat by the placement of columns supporting the proposed 2nd Access Project, as well as alteration of essential fish habitat through shading from the proposed causeway, sediment impacts due to turbidity from the proposed 2nd Access Project construction activity, and contaminants found in stormwater runoff or hazardous material spills originating from the roadway.

Other potential impacts to essential fish habitats are varied, consisting primarily of impacts to seagrass beds, both direct impacts such as dredging activities or outboard boat traffic as well as to indirect impacts such as non-point nutrient pollutant inputs in runoff from agricultural areas.

Permanent impacts to essential fish habitat would be due to seagrass removal, shading by the bridge structure and introduction of a new element to essential fish habitat, namely, bridge pilings. While this habitat element may alter the behavior of the existing fishery, it may nevertheless provide beneficial habitat for some species.

Moreover, induced construction activity adjacent to the RSA could result in increased sediment and nutrient pollutant inputs to the Laguna Madre with associated effects to seagrass and essential fish habitat.

Approximately 5.7 percent of the RSA has already developed in the past or is planned for development in the foreseeable future (including the current action). However, extensive effectively protected areas exist in the RSA, totaling 129,501.5 acres of open water.

The intent of Section 404 of the Clean Water Act is to protect the nation's waters from the indiscriminate discharge of material capable of causing pollution, and to restore and maintain

their chemical, physical and biological integrity. Any discharge into waters of the U.S. must be in accordance with Section 404(b)(1) guidelines developed by the EPA in conjunction with the USACE. In the Section 404 permit process, permit applications are reviewed by the USACE for compliance with Section 401 of the Clean Water Act. In summary, the proposed project's impact to Laguna Madre water quality, with associated effects to seagrass within essential fish habitat, would be avoided or minimized by compliance with the USACE nationwide and individual permit programs. Similarly, development compliant with the Clean Water Act elsewhere in or adjacent to the RSA would not be expected to contribute to water quality impacts to essential fish habitat.

The threats described in conservation documents were reviewed to understand the potential cumulative effect on red drum, shrimp, stone crab, reef fish, and migratory coastal pelagic species (species for with FMP-designated management areas, **Section 3.7.3.5**) encompassing the RSA.

Red Drum

Decrease in Laguna Madre larval and juvenile red drum seagrass (foraging) habitats has been noted since the 1970s (TPWD 2009). In Texas, approximately 235,000 acres of seagrasses has been lost as of 1994 (TPWD 1999). The Nature Conservancy states that shoalgrass has decreased by 60.0 percent in 20 years while totally de-vegetated areas have increased almost three-fold.

Dredging and filling activities have been widely recognized as one of the major anthropogenic disturbances contributing to the destruction of seagrass meadows, due to direct burial and from the disturbance of sediments and low dissolved oxygen caused by dredging operations. Excess non-point source nutrient pollutants in runoff are associated with algae blooms, such as 'brown tide' which are detrimental to seagrass beds. Light reduction from maintenance dredging of the Gulf Intracoastal Waterway was the suspected cause of large-scale loss of seagrass cover in deep parts of the Laguna Madre between surveys conducted in 1965 and 1974 (TPWD 1999).

Development along shorelines may affect conditions of water depth and currents and cause loss of seagrasses. Artificial stabilization using bulkheads, rip-rap and other erosion control measures can contribute to deeper-water conditions near shore by inhibiting the natural development of a broad, shallow and gently-sloping bay margin profile. Improperly designed, piers and overwater structures present special problems to seagrass habitats through surface light reduction, affecting underlying seagrass beds (TPWD 1999). Other development-related effects include increased boating recreation and associated prop scarring of seagrass beds.

Potential cumulative effects to red drum seagrass habitat to which the current action could contribute include direct impacts from project construction, shading encroachment impacts with associated seagrass loss, and inducement of local development with associated increased potential for associated impacts to Laguna Madre seagrass habitats.

However, extensive protected areas exist in the RSA, totaling 169,775.3 acres of open water and seagrass beds; seagrass meadows in the Laguna Madre are still abundant. As waters of the state and U.S., the entirety of open water of the Laguna Madre is protected from unregulated impacts through the provisions of the Clean Water Act.

The proposed project's impact to red drum and its habitats would be minimized by design undertaken in consultation with the NMFS, USFWS and TPWD and by compliance with federal and state laws. As a result, the proposed project would not substantially contribute to significant

cumulative impacts to red drum. Because of the abundance of local conservation lands, as well as regulatory (CWA) safeguards, the cumulative effect of development near the Laguna Madre is expected to retain a large degree of protection for larval and juvenile red drum habitat.

Shrimp

Disruption and disturbance of Laguna Madre post-larvae and juvenile shrimp benthic (foraging) habitats is associated with Gulf Intracoastal waterway dredging and development-related dredging activity. Dredging and filling activities have been widely recognized as one of the major anthropogenic disturbances, contributing to disturbance of sediments and low dissolved oxygen, detrimentally affecting benthic habitats. Development-related effects from shoreline development include increased boating recreation with associated increased turbidity and associated depressed dissolved oxygen levels.

Potential cumulative impacts to which the current action could contribute include removal of benthic habitat by the placement of columns supporting the proposed 2nd Access Project, as well as alteration of benthic habitat through shading from the proposed causeway and sediment impacts due to turbidity from the proposed 2nd Access Project construction activity.

Extensive protections for shrimp essential fish habitat exist in the RSA. Suitable benthic foraging habitats in the Laguna Madre are still abundant. As waters of the state and U.S., the entirety of open water of the Laguna Madre is protected from unregulated impacts through the provisions of the Clean Water Act. Moreover, as noted previously, the total annual shrimp catch is heavily dependent on estuarine conditions (salinities, temperature, tidal heights in marshes) that are largely uninfluenced by the cumulative impacts of human activity.

The proposed project's impact to post-larvae and juvenile shrimp and their habitats would be minimized by design undertaken in consultation with the NMFS, USFWS and TPWD and by compliance with federal and state laws. As a result, the proposed project would not substantially contribute to significant cumulative impacts to brown, white, and pink shrimps. Because of the abundance of local conservation lands, as well as regulatory (CWA) safeguards, the cumulative effect of development near the Laguna Madre is expected to retain a large degree of protection for post-larvae and juvenile shrimp.

Stone Crab

Potential cumulative impacts to these species correspond to those for red drum and shrimp, discussed previously. These include direct removal of seagrass beds and benthic habitats from 2nd access construction and indirect effects to these habitats from bridge shading and induced development.

Extensive protections for stone crab essential fish habitat exist in the RSA. Undisturbed seagrass and benthic habitats are still abundant. As waters of the state and U.S., the entirety of open water of the Laguna Madre is protected from unregulated impacts through the provisions of the Clean Water Act. Moreover, as reported by the NMFS, populations are estimated to be currently high with no overfishing occurring.

The proposed project's impact to the stone crab and its habitats would be minimized by design undertaken in consultation with the NMFS, USFWS and TPWD and by compliance with federal and state laws. As a result, the proposed project would not substantially contribute to significant cumulative impacts to the gulf stone crab. Because of the abundance of local conservation lands, as well as regulatory (CWA) safeguards, the cumulative effect of development near the Laguna Madre is expected to retain a large degree of protection for this species.

Reef Fish

As discussed previously, decrease in Laguna Madre juvenile reef fish seagrass and other habitats is ongoing. In Texas, approximately 235,000 acres of seagrasses has been lost as of 1994 (TPWD 1999). Impacts to seagrass and unvegetated benthic habitats come from dredging operations with associated turbidity and depressed dissolved oxygen levels, development-related shoreline erosion control measures affecting water depth and light penetration, and algal blooms from anthropogenic pollutant nutrient inputs. Other development-related effects include increased boating recreation and associated prop scarring of seagrass beds and disruption of benthic habitats.

Potential cumulative impacts to which the current action could contribute include removal of seagrass and benthic habitat by the placement of columns supporting the proposed 2nd Access Project, as well as alteration of benthic habitat through shading from the proposed causeway and sediment impacts due to turbidity from the proposed 2nd Access Project construction activity. Conversely, introduction of the new structures could serve as reef-building areas, potentially serving as an attractant to some reef fish species; populations of species not typically associated with the open Laguna Madre could potentially become established.

Extensive protections for reef fish essential fish habitat exists in the RSA. Undisturbed seagrass and benthic habitats for estuary-dependent reef fish prey are still abundant. As waters of the state and U.S., the entirety of open water of the Laguna Madre is protected from unregulated impacts through the provisions of the Clean Water Act.

The proposed project's impact to habitats would be minimized by design undertaken in consultation with the NMFS, USFWS and TPWD and by compliance with federal and state laws. As a result, the proposed project would not substantially contribute to significant cumulative impacts to reef fish prey species. Moreover, as discussed above, beneficial effects to reef fish could accrue from introduction of 2nd access pier structures. Because of the abundance of local conservation lands, as well as regulatory (CWA) safeguards, the cumulative effect of development near the Laguna Madre is expected to retain a large degree of protection for reef fish through preservation of their prey species' habitats.

Coastal Migratory Pelagics

This group would be affected similarly to reef fishes, as the Laguna provides prey species habitat for both groups. Contribution to cumulative impacts from the proposed project and local development would be accordingly similar; however, reef-building effects from bridge pier placement potentially benefitting reef species would not be expected to affect migratory pelagic species.

Extensive protections for coastal migratory pelagic fish essential fish habitat exists in the RSA. Undisturbed seagrass and benthic habitats for estuary-dependent reef fish prey are still abundant. As waters of the state and U.S., the entirety of open water of the Laguna Madre is protected from unregulated impacts through the provisions of the Clean Water Act.

The proposed project's impact to habitats would be minimized by design undertaken in consultation with the NMFS, USFWS and TPWD and by compliance with federal and state laws. As a result, the proposed project would not substantially contribute to significant cumulative impacts to coastal migratory pelagic fish prey species. Because of the abundance of local conservation lands, as well as regulatory (CWA) safeguards, the cumulative effect of development near the Laguna Madre is expected to retain a large degree of protection for coastal migratory pelagic fish through preservation of their prey species' habitats.

In summary, the proposed project would not substantially contribute to significant cumulative impacts to essential fish habitat, including FMP-designated management areas for red drum, shrimp, stone crab, reef fish, or coastal migratory pelagic fish. Because of the abundance of conservation lands bordering the RSA and conservation efforts targeted at seagrass protection, the cumulative effect of RSA development is expected to retain existing essential fish habitat integrity in the RSA.

6.3.9.8 Step 8: Mitigation – Essential Fish Habitat

It is anticipated that this development trend would continue as the region continues to grow. However, if development rates increase in intensity, impacts to essential fish habitat could occur over time. Thus, it becomes more crucial that essential fish habitat protections are strengthened and fully implemented.

It is impossible to discuss impacts to essential fish habitat without addressing mitigation measures and the foresight of agencies and conservation groups to mitigate these losses. Above in *Step 3* and *Step 6* are descriptions of regulatory and conservation measures implemented in the RSA.

Consultation with the NOAA Fisheries must occur for actions with any form of federal involvement that have the potential for adverse impacts to essential fish habitat. The NOAA Fisheries reviewed more than 2,700 proposed development actions in the five Gulf States during 2000 and 2001.

A number of non-regulatory initiatives have been undertaken within the RSA to conserve essential fish habitat. Examples of private or non-regulatory initiatives aimed at preserving seagrass and therefore essential fish habitat include a Nature Conservancy-led initiative to encourage boaters to use voluntary marked boat lanes in portions of the Laguna Madre (Nature Conservancy 2009). TPWD's Seagrass Conservation Plan (1999) promotes of non-regulatory water quality management activities through watershed management programs, further safeguarding essential fish habitat.

As discussed previously, most seagrass meadows in the Laguna Madre are state-owned. Moreover, ownership of much of the Laguna Madre shoreline by the USFWS and National Park Service (north of the RSA) provides protection from shoreline development in these areas, with associated potential for impacts to seagrass within essential fish habitat. Additionally, private ownership (ranchland) of much of the remaining Laguna Madre shoreline provides, at least in the short term, protection from shoreline development. According to TPWD, these measures have, to this point, resulted in much of the Laguna Madre remaining in pristine condition (TPWD 2009).

Reliance on regulatory programs to ensure future environmental protection does not provide complete protection of the resource. For example, there is some likelihood that minor Section 404 regulatory infractions could occur in future proposed development in and adjacent to the RSA. This could result in limited unpermitted and unmitigated impacts to surface water quality, with associated impacts to seagrass beds in essential fish habitat. Impacts to surface waters (excluding wetlands) which are less than one-tenth of an acre need not be reported to the USACE; however, those which are compliant Clean Water Act regulations are anticipated to have minor water quality impacts.

It is important to stress with regard to this project that all impacts to essential fish habitat associated with this project would be mitigated in compliance with all applicable regulatory standards. The CCRMA would coordinate the project with TCEQ, TPWD and the NOAA Fisheries by sending copies of the South Padre Island 2nd Access Project draft environmental impact statement and final environmental impact statement documents for their review and comments regarding impacts to this resource.

Fishery Management Plan Species – Red Drum, Shrimp, Stone Crab, Reef Fish, Migratory Coastal Pelagic Fish

Development trends are anticipated to continue as the region continues to grow. However, if development rates increase in intensity, habitat impacts and loss for red drum could occur over time. Thus, it becomes more crucial that habitat loss protections are strengthened where needed, fully implemented, and consistently enforced.

It is impossible to discuss Laguna Madre habitat loss without addressing mitigation measures and the foresight of agencies and conservation groups to mitigate these losses. As discussed previously, the Endangered Species Act, Marine Mammal Protection Act, TPWD regulations, NMFS Fishery Management Plans, and the Coastal Barrier Resources Act afford a measure of habitat protection for Laguna Madre habitats.

The NMFS has authority over actions affecting species or groups with FMPs, by way of proposed harvest regulations for FMP species (size class, amount). The proposed management measures become federal regulations when implemented by the Secretary of Commerce, and are enforced by the USCG, the NMFS, and state game wardens.

In addition, a number of initiatives have been undertaken within the RSA to conserve habitats for threatened and endangered species and rare species. These include establishment of LANWR and other conservation lands.

Reliance on regulatory programs to ensure future environmental protection does not provide complete protection of the regulated resource. Regulations are subject to violation, and not all losses of threatened and endangered species and rare species would be permitted or reported and not all violations would be discovered and pursued. There is some likelihood that take would occur in conjunction with some of the proposed development in the RSA. Impacts which are compliant with applicable regulations would be anticipated to be minor. Those which are non-compliant may result in unmitigated losses.

It is important to stress with regard to this project that CCRMA has been in ongoing consultation with the USFWS, NMFS and TPWD throughout project development, and would coordinate the project with these agencies by sending copies of the South Padre Island Proposed 2nd Access Project draft environmental impact statement and final environmental impact statement documents for their review and comments. In addition, a Biological Evaluation (BE) and Essential Fish Habitat Assessment would be prepared for consultation with the USFWS, TPWD, NMFS, and GLO. Wherever applicable, the determination of the appropriateness of mitigation and development of specific mitigation efforts would occur in coordination with TPWD, USFWS, CCRMA, TxDOT, and the USACE.

6.3.10 Migratory Birds

6.3.10.1 Step 1: Resource Identification - Migratory Birds

The resource is all migratory birds, including neotropical migrant songbirds, waterfowl, shorebirds and wading birds, including colonial wading bird rookeries on Laguna Madre spoil islands. The lower Rio Grande Valley is recognized as a world-class birding destination (World Birding Center 2009). The importance of migratory birds to the local economy, combined with concern for loss of migratory bird habitat in conjunction with on-going development, make analysis necessary. Threatened and endangered migratory bird species and migratory bird species of concern were also addressed in **Sections 6.3.5, 6.3.6** and **6.3.7**.

6.3.10.2 Step 2: RSA – Migratory Birds

The RSA for migratory birds mirrors that for Freshwater Wetlands, and is shown in **Exhibit 6-10**. The migratory bird RSA comprises 618,297 acres. Of this acreage, 113,197.2 acres are protected, 20,143.0 acres are designated critical habitat, and 98,496.1 acres are the open waters of the Laguna Madre. Therefore, 386,460.7 acres are developable lands.

6.3.10.3 Step 3: Resource Health and Historical Context – Migratory Birds

According to the USFWS, nearly half of all the bird species of the continental U.S. occur in LANWR (USFWS 2009), located in the eastern section of the RSA. More than 500 bird species occur at the Lower Rio Grande National Wildlife Refuge, located in units along the southern border of the RSA, due to the convergence of Central and Mississippi flyway migrants and the area's location as the northernmost limit of range of many South and Central American birds (USFWS 2009). South Padre Island is an important migratory bird fallout area for trans-gulf migratory from southern Mexico and Central America. Padre Island is the first landfall for many of these neotropical and nearctic birds and provides critical resting and feeding habitats. The dense thorn-scrub brush and rangeland provide nesting habitat for migratory birds. The importance of migratory birds is indicated by the siting of the South Padre Island World Birding and Nature Center immediately south of the proposed 2nd Access Project.

The Laguna Madre serves as a breeding ground for aquatic birds and a wintering and stopover area for numerous species. The shallow seagrass areas provide feeding grounds for wintering duck populations. Fish species associated with the areas of underwater vegetation are important as waterfowl food (Nature Conservancy 2009). Hypersalinity, geographic and climatic factors currently provide ideal conditions for seagrasses, which account for much of the structure and cover sought by foraging aquatic bird species, including at least 77.0 percent of the North American redhead duck population (Nature Conservancy).

About 20 species of migratory waterfowl winter on LANWR. The Laguna Madre, partly encompassed by the National Wildlife Refuge, is the end of the Central Flyway. As a result, the fall season brings high numbers of ducks and geese on the Laguna Madre. As noted previously, LANWR is especially well known for its concentration of wintering redhead ducks. Moreover, thousands of shorebirds can be seen feeding at the refuge on tidal mud and salt flats and wetland areas during the winter and especially during spring migration. Many visitors come to LANWR during April and early May specifically to see many species of spring migrants including warblers, buntings, orioles and vireos (TPWD 2009).

Colonial waterbird nesting rookeries occur on numerous Laguna Madre dredge spoil islands, which support 23 species of herons, ibises and egrets. Due to differences in the nesting periods

among these species, the islands are in use at least seven months of the year. Minimal predation on the islands is key to nesting success (Nature Conservancy 2005).

As discussed previously**,** more than 80.0 percent of Cameron County land was converted to farms and ranches by the early 1990s (Garza and Long 2009). An estimated 95.0 percent of native habitat has been removed from the Lower Rio Grande Valley (USFWS 2009), with associated effects to migratory birds.

Land use changes typically drive loss of migratory bird habitats. The conversion of habitats such as thorn-scrub, rangeland, sand dune and wetlands to developed or agricultural uses is the main threat to migratory birds. Based on examination of 1977 and 2008 aerial photography, an estimated 26,051.8 acres were developed in 1977 and 70,226.0 acres were developed in 2008. There are currently 651 of the RSA's 1,709 subdivisions, totaling approximately 25,316.1 acres, under development. Approximately 168,755 acres of developable shrub/scrub, rangeland, wetland and sand dune habitats remain in the RSA, which comprises 43.7 percent of the developable RSA.

Numerous conservation areas have been established, partly in recognition that historic removal of native vegetation through cattle ranching and agriculture, and more recently for development, has depleted migratory bird habitats. These areas are engaged in preservation and restoration of natural habitats, including brushland, rangeland and aquatic and wetland habitats. These areas use various management techniques to promote growth of natural vegetation and enhancement of migratory bird habitat. The largest collection of conservation lands are owned by the USFWS. These are Santa Ana, Laguna Atascosa and Lower Rio Grande Valley National Wildlife Refuges, established in 1943, 1946 and 1979, respectively. In addition, State of Texas-owned Las Palomas Wildlife Management Area was established in Cameron County in 1985. Altogether, these federal and state owned conservation holdings total over 13,800 acres. Private conservation initiatives include the 1,034-acre Nature Conservancy Lennox Foundation Southmost Preserve and 640-acre Sabal Palm Sanctuary owned and operated by the Audubon Society.

Because the TxDOT guidance on cumulative impacts analysis requires the NEPA practitioner to evaluate resources that are in poor or declining health or at risk (even if project impacts are minor), cumulative impacts to migratory birds in the RSA will be evaluated further.

6.3.10.4 Step 4: Direct and Indirect Impacts – Migratory Birds

The proposed project would have total direct and indirect (seagrass) impacts ranging from 362.6 to 529.3 acres of potential habitat for migratory birds in the RSA, depending on the build alternative (**Table 6-39**) and any habitat affected by underground utility relocation outside the proposed 2nd Access ROW, if required.

Table 6-39: Direct Habitat Impacts By Alternative

Alternative	Wetlands* (acres)	Open Water**	Seagrass***	Thorn-scrub Brush, Riparian, Rangeland	Dunes	Total (acres)
1	22.9	105.6	83.6	174.2	50.3	436.6
2	55.8	41.7	83.6	217.4	50.3	448.8
3	55.1	0.0	66.4	274.0	50.3	445.8
4	22.1	105.6	124.1	180.7	28.3	460.8
5	55.0	41.7	124.1	223.8	28.3	472.9
6	28.2	0.0	122.5	291.8	28.3	470.8
7	39.4	5.3	122.5	227.7	28.3	423.2
8	11.6	105.6	144.9	139.7	0.0	401.8
9	12.2	110.9	144.9	175.3	0.0	443.3
10	17.2	0.0	131.9	251.5	0.0	400.6
11	28.3	5.3	131.9	187.4	0.0	352.9

Source: HNTB (2009)
*Freshwater and Estuarine
** Freshwater and Estuarine, including shrimp farm, not including Laguna Madre.
***Direct and Indirect impact

According to *Proposed South Padre Island Second Access Project Economic Analysis*, an estimated 402.1 acres of induced development (239.8 acres on South Padre Island and 162.3 acres on the mainland) could occur by 2045 as a result of the proposed 2nd Access Project above the No-Build Alternative (TXP, Inc. 2009). Potential impacts to 233.2 acres of migratory bird habitat could result; however, direct impacts to rookery habitat would not be anticipated from this projected development.

6.3.10.5 Step 5: Reasonably Foreseeable Actions – Migratory Birds

Except for Gulf of Mexico waters, the RSA boundary mirrors the surface water quality RSA; therefore, reasonably foreseeable development activity for the current RSA is identical to that for the water quality RSA. A total of 173 subdivisions, totaling approximately 5,139.8 acres, are slotted for future development (all parcels and platted lots vacant). Subdivision information for the RSA is listed in **Table 6-8** (**Section 6.3.2.5**). Additionally, according to *Proposed South Padre Island Second Access Project Economic Analysis*, an additional 397.0 acres of induced development beyond that induced by the 2nd Access Project could occur by 2045, as a result of full build-out of the other CCRMA roadway projects. It should be noted this projection for induced development only accounts for the effect of CCRMA Plan roadways. Additional induced development in the RSA could result from full build-out of Brownsville and Harlingen-San Benito Metropolitan Planning Organization and TxDOT Surface Transportation Improvement Plan Project roadways. Proposed roadway projects for the RSA are identical to those for the surface water quality RSA (**Table 6-9, Section 6.3.2.5**). To summarize, approximately 45 roadway improvement projects are foreseeable in the RSA. An estimated 1,016.3 acres of potential shrub-scrub and rangeland migratory bird habitat, and almost no wetland, is encompassed within proposed ROWs for these projects. Total impacts to migratory bird habitat are estimated 4,228.1 acres of migratory bird habitat within the RSA.

The LANWR Proposed Refuge Expansion Plan (1999) includes plans to acquire an additional approximately 114,637.5 acres within the RSA.[29]

[29] Estimate based on a geographic information system analysis of Expansion Plan information, geographic information system city limits data, and 2nd Access Proposed ROW. Area within city limits/extraterritorial jurisdictions and 2nd Access Proposed ROW were subtracted from mapped acquisition area.

6.3.10.6 Step 6: Cumulative Impacts Assessment – Migratory Birds

In this step, cumulative impacts are identified and the magnitude of those effects is evaluated. Development pressure and associated loss of terrestrial habitat or integrity of aquatic or wetland habitats are the main threats to migratory bird habitats in the RSA. Habitat loss is typically correlated to the degree to which an area is developed; therefore, it is important to review relevant regulations related to development within the RSA.

The Migratory Bird Treaty Act of 1918 established a federal prohibition, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird (USFWS 2009). The original 1918 statute implemented a prior convention between the U.S. and Canada. A 1936 amendment implemented a treaty between the U.S. and Mexico. The TPWD regulates hunting seasons for migratory game birds such as mourning dove, white-winged dove and waterfowl species including mallard and Canada goose. The proposed project's impact to migratory birds would be avoided or minimized by compliance with stipulations of the Migratory Bird Treaty Act.

Analysis of data for subdivisions, roadway information and aerial photo interpretation indicates that approximately 95,542.1 acres has already been fully developed or is under development. The majority of this past development is roadway and low density, suburban residential land use. Another 119,219 acres of the land encompassing approximately 113,197.2 acres of thorn-scrub shrub, rangeland and wetland habitat was preserved either fee simple or through conservation easements as parks, preserves, or conservation lands. Another approximately 20,143.0 acres have been designated critical habitat for the Piping Plover by the USFWS. While not a prohibition to development, a critical habitat designation necessitates consultation with the USFWS for any action with federal involvement such as funding or permitting (USFWS 2009). Another 98,496.1 acres of open waters of the Laguna Madre and South Bay effectively serve as conservation land for waterfowl.

The current action accounts for approximately 263.3 to 389.7 acres of additional development (depending on the build alternative) within the RSA. In addition, an estimated 233.2 acres of induced development could occur from the proposed 2nd Access Project.

Reasonably foreseeable future actions include planned roadway projects and planned developments. These future actions account for another approximately 5,536.8 acres. An additional 397.0 acres of induced development could occur in the RSA as a result full build-out of the other CCRMA roadway projects. An estimated 114,637.5 acres of land, encompassing approximately 70,128.3 acres of thorn-scrub, rangeland, wetland and open water migratory bird habitats, is proposed for acquisition for the LANWR (USFWS 1999).[30]

Refer to **Table 6-40** for a summary of the potential cumulative effect area within the RSA.

[30] Estimate based on a geographic information system analysis of Expansion Plan information, geographic information system city limits data, and 2nd Access Proposed ROW. Area within city limits/extraterritorial jurisdictions and 2nd Access Proposed ROW were subtracted from mapped acquisition area.

Table 6-40: Potential Cumulative Effect Area within the Migratory Bird RSA

Type of Action	Past Actions	Current Action*	Reasonably Foreseeable Actions	Cumulative Effect**
Development	26,051.8 acres developed in 1977 70,226.0 acres developed in 2008 26,051.8 acres currently under development Total = 95,542.1 acres Total impact to migratory bird habitat = approximately 14,685.3 acres	Direct Impact – max. 389.7 acres Indirect Impact – approx. 233.2 acres of induced development Total Impact to migratory bird habitat = 622.9 acres	5,536.8 acres of subdivisions 2,506.6 acres roads Approx. 397.0 acres induced development from other CCRMA projects Total Impact = 6,553.1 acres Total impact to migratory bird habitat = 4,228.1 acres	Total Cumulative Effect = 22,536.7 acres migratory bird habitat
Conservation	119,219 acres of conservation land (parks, preserves). 98,496.1 acres of open water (Laguna Madre, South Bay) waterfowl habitat	-	Potential for addition of 114,637.5 acres to LANWR	332,352.6 acres of conservation land (281,821.6 acres of habitat***)
Ratio (D:C)****	-	-	-	1: 12.5 (habitat***)

Source: HNTB (2009)
* Assumes that subdivisions currently being developed will continue to develop prior to the letting date of the 2nd Access Project.
**Incorporates highest potential direct impact.
***Thorn-scrub brush, rangeland, aquatic, wetland, open water habitats
****Ratio of Development acreage to Conservation acreage

6.3.10.7 Step 7: Results – Migratory Birds

Threats to migratory bird conservation were reviewed to understand the potential cumulative effect on this resource in the RSA. Potential cumulative effects to which the current action could contribute include encroachment upon rookeries on Laguna Madre spoil islands and conversion of thorn-scrub shrub, rangeland, or wetland habitats to developed uses. Other potential effects include threats to Laguna Madre water quality, including associated effects to seagrass beds, from increased sediments and contaminants found in stormwater runoff or hazardous material spills originating from the roadway. Sediment and pollutants from development induced by the project near the Laguna Madre could similarly affect Laguna Madre water quality. These water quality effects could affect the integrity of seagrass, which serves as foraging habitat for waterfowl, including redheads.

Conversion of thorn-scrub brush, rangeland and wetland and associated habitats to developed uses would be the most likely cause of impacts to migratory birds in the RSA. Approximately 9.0 percent of the RSA has already developed in the past or is planned for development in the foreseeable future (including the current action). However, extensive conservation lands exist in the RSA, totaling approximately 119,219 acres. While an estimated 168,753.93 acres of thorn-

scrub, rangeland and wetland habitats in the RSA are located outside conservation areas and would therefore be considered potentially developable, a high proportion of these occur within 100-year floodplains, limiting actual development potential. It should be noted that development nevertheless occurs within floodplains. Numerous Cameron County colonias, many established in floodplain areas, are recipients of ongoing local, federal and state funding to upgrade deficient infrastructure such as water and wastewater services or roads.

Development implemented pursuant to applicable regulations will not result in violation of the Migratory Bird Treaty Act. As a result, actual take of migratory birds or nest destruction would not be anticipated from development activity. The proposed project's impact to migratory birds and their habitats would be minimized by design undertaken in consultation with the USFWS and TPWD and by compliance with federal and state laws. As a result, the proposed project would not substantially contribute to significant cumulative impacts to migratory bird habitat loss in the RSA.

Because of the abundance of conservation lands in the RSA, as well as Act prohibitions, the cumulative effect of mainland development is expected to retain a large proportion of migratory bird habitats (Thorn-scrub brush, rangeland, wetland, Laguna Madre and dunes) in the RSA, including colonial waterbird rookeries on Laguna Madre spoil islands.

6.3.10.8 Step 8: Mitigation – Migratory Birds

It is anticipated that this development trend would continue as the region continues to grow. However, if development rates increase in intensity, migratory bird habitat loss could occur over time. Thus, it becomes more crucial that habitat protection measures are strengthened where needed, fully implemented and consistently enforced.

It is impossible to discuss impacts to migratory bird habitats in the region without addressing mitigation measures and the foresight of local planners to mitigate habitat losses. Above in *Step 3* and *Step 6* are descriptions of regulatory and conservation measures implemented in the RSA.

A number of initiatives have been undertaken within the RSA to conserve habitats for migratory birds. These include establishment of three national wildlife refuges (Laguna Atascosa, Santa Ana, Lower Rio Grande Valley), two state wildlife management areas (Las Palomas, Arroyo Colorado), two state parks (Boca Chica, Resaca de la Palma) Sabal Palm Audubon Sanctuary (Audubon Society) and Lennox Foundation Southmost Preserve (Nature Conservancy). The North American Wetlands Conservation Act (2009) specifically encourages partnerships to conserve North American wetland ecosystems for waterfowl and other migratory birds.

The City of Brownsville Comprehensive Plan (2009), in recognition of the lower Rio Grande valley's status as one of the top birding destinations in North America, recommends measures to promote urban migratory bird habitat and associated ecotourism. These include native landscaping techniques to attract migratory birds, preservation of dense regions of tree coverage, and in particular preservation of urban resacas as natural areas with associated opportunities for birdwatching.

Another example of local interest in migratory bird conservation is the opening of the City of South Padre Island Birding Center on September 26, 2009. The City of Harlingen likewise recognizes high citizen interest in development of bird watching facilities, as stated in its Comprehensive Plan (2009).

As stated previously, the USFWS has authority over actions resulting in adverse effects to threatened or endangered migratory birds. For example, the USFWS established critical habitat for the Piping Plover, some of which is located in the RSA. A critical habitat designation affects activities with federal involvement, such as federal funding or a federal permit.

Within the Laguna Madre, the areas of greatest importance for colonial waterbirds are wind-tidal flats, the Laguna itself, and rookery islands. The first two areas are important foraging habitat; the latter is critical nesting habitat. In view of this, part of the Lower Laguna Madre has been designated a Western Hemisphere Shorebird Reserve of International Significance. This area hosts at least 100,000 shorebirds annually, or 10.0 percent of the species flyway population based on peak species counts, including over 10.0 percent of the world's population of the threatened Piping Plover (Nature Conservancy).

Reliance on regulatory programs to ensure future environmental protection does not provide complete protection of migratory bird habitats. There is a high likelihood that habitat impacts would occur in conjunction with development on the approximately 255,070 acres of remaining developable land in the RSA (not in the 100-year floodplain). Impacts to potential migratory bird habitats not designated as critical habitat need not be reported to the USFWS, underscoring the importance of voluntary conservation efforts. Actions which are compliant with the Migratory Bird Treaty Act are anticipated to have minor impacts to individual birds and their nests, although the Act provides no protection of habitats.

It is important to stress with regard to this project that all impacts to migratory birds associated with this project would be mitigated in compliance with all applicable regulatory standards. The CCRMA would coordinate the project with the USFWS and TPWD by sending copies of the South Padre Island 2nd Access Project draft environmental impact statement and final environmental impact statement documents for their review and comments regarding migratory bird impacts.

6.3.11 Summary of Cumulative Impacts Analysis

Cumulative impacts analysis results are summarized in **Table 6-41**.

Table 6-41: Summary of Cumulative Impacts Analysis

RSA	Past Actions	2nd Access Project Direct/Indirect	Reasonably Foreseeable Future Actions	Total Cumulative Effect
Regional Economics	14,097 jobs between 2000 and 2008	2,583 jobs by 2045	93,916 jobs by 2040 2,554 jobs by 2045	113,150 jobs by 2045
Surface Water Quality	95,542.1 acres development	438.8 acres development	6,665.8 acres development	102,646.7 acres of development
Waters of the US - Freshwater Wetlands	1,457.0 acres impact	51.7 acres impact	359.5 acres impact	1,868.1 acres impact
Waters of the US - Estuarine Wetlands	1,291.9 acres impact	52.4 acres impact	491.7 acres impact	1,548.9 acres impact
Threatened and Endangered Species – Mainland	14,853.3 acres impact	454.2 acres impact	7,795.5 acres impact	18,930.7 acres impact
Northern Aplomado Falcon	6,564.8 acres impact	410.4 acres impact	1,846.8 acres impact	8,821.9 acres impact
Ocelot/Jaguarundi	7,022.9 acres impact	152.8 acres impact	1,945.0 acres impact	9,120.6 acres impact
Threatened and Endangered Species - Laguna Madre	2,263.7 acres development	515.4 acres development adjacent to RSA 113.8 acres impact	468.3 acres development adjacent to RSA	3,134.1 acres development adjacent to RSA 113.8 acres impact
Threatened and Endangered Species – Island	738.4 acres impact	103.2 acres impact	248.0 acres impact	1,027.2 acres impact
Rare Vegetation and Seagrasses	15,508.2 acres impact	287.3 acres impact	4,991.3 acres impact	20,786.8 acres impact
Essential Fish Habitat	No development within RSA	140.9 acres impact	7,622.1 acres development adjacent to RSA	140.9 acres impact within RSA 7,622.1 acres development adjacent to RSA
Migratory Birds	14,685.3 acres impact	622.9 acres impact	4,228.1 acres impact	22,536.7 acres impact

CHAPTER 7

MITIGATION AND PERMITTING

LIST OF TABLES

CHAPTER 7

MITIGATION AND PERMITTING

Practicable efforts have been made in the planning process to avoid impacts to the human and natural environments. When impacts are unavoidable, steps would be taken first to minimize impacts and then to mitigate for impacts, as required under the National Environmental Policy Act (NEPA), Federal Highway Administration (FHWA) and Texas Department of Transportation (TxDOT) guidelines. According to the Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] 1508.20), mitigation efforts may be defined as:

- Avoiding an impact altogether.
- Minimizing the impact by limiting the degree or magnitude of the action.
- Rectifying the impact by repairing, rehabilitating and restoring the resource.
- Reducing or eliminating the impact over time by preservation and maintenance activities.
- Compensating for the impact by replacing or providing substitutes to the resource impacted.

Efforts have been made in the selection of alternatives and the identification of the preferred alternative to avoid or minimize adverse effects. Where impacts to resources require coordination and permitting, required processes would be followed with the appropriate agency.

Given the environmental sensitivity of the project area and the scope of the proposed project, the project sponsors (TxDOT and CCRMA) are committed to developing a comprehensive mitigation plan for the proposed project. The mitigation plan will be developed in cooperation with state and federal resource agencies and will be designed to mitigate for unavoidable project impacts in accordance with applicable requirements of state and federal law.

As discussed in **Chapter 3** and **4**, several resources either do not occur within the project area or adverse impacts to the resources would not occur as the result of the proposed project. Within the project area, there are no facilities designated for pedestrian or bicycle transportation modes. In addition, no Wild and Scenic Rivers occur within the project area. Therefore, no mitigation is proposed for these resources.

As discussed in **Chapter 4**, the proposed project would not adversely impact a disproportionally high minority or low-income population or populations with limited English proficiency within the project area. Therefore, no mitigation for these issues is proposed.

The purpose and need of the proposed project includes the need to provide economic benefits to the local and regional area. Economic impacts to the project area are considered to be beneficial to the local and regional economies as presented in **Chapters 3**, **4**, **5**, and **6**. Therefore, no mitigation would be necessary.

This chapter includes potential mitigation options (**Section 7.19**) that will be further developed into the comprehensive mitigation plan as the project develops and agency coordination continues.

7.1 SOCIAL ENVIRONMENT

7.1.1 Community Cohesion and Quality of Life

Efforts have been made in the planning stages to avoid or minimize effects to sensitive resources, including community cohesion and quality of life standards. Where possible, the

preferred alternative would be placed along and close to existing property lines to minimize splitting or fragmentation of farms and ranches. Existing roads used for property access that may be split by the preferred alternative would be realigned in accordance with TxDOT policies to accommodate the property owner's access needs. Furthermore, public meetings have been held, and additional public meetings would be held, as needed, during the environmental process to discuss specific community and landowner concerns prior to construction of the preferred alternative.

7.1.2 Relocation

TxDOT offers relocation counseling and financial assistance to residents and business owners that are displaced by the acquisition of right-of-way (ROW) in accordance with the Federal Uniform Relocation and Real Property Acquisition Policies Act of 1970. Once it has been determined that a structure must be acquired in order to construct the roadway, the property owner and/or tenant is contacted by a relocation counselor who provides information on exactly what benefits for which the owner/tenant is eligible and who assists the owner/tenant in applying for those benefits. In general, the relocation counselor would provide listings of comparable housing, transportation to inspect the housing (especially for elderly and handicapped persons), and referrals to other agencies that provide assistance for relocated persons.

Properties presented as comparable would be of similar size in terms of number of rooms, living space, location and square footage. The properties would be available for purchase and within the financial means of the potentially displaced person. The replacement housing must meet all minimum standards established by the FHWA and TxDOT (decent, safe and sanitary) and conform to all local building codes. Depending on the difference in prices of properties that are comparable in all other criteria, financial assistance in the form of a purchase supplement, rental assistance payments, or a mortgage down payment may be offered to the potentially displaced person. In any case, a potentially displaced person would not be required to move until comparable replacement dwellings are presented.

In addition to residential relocation assistance, TxDOT also provides assistance to businesses, farms and nonprofit organizations required to relocate. These benefits may be in the form of reimbursements for reasonable moving expenses and reestablishment expenses.

7.2 SOILS AND FARMLANDS

7.2.1 Soils

Potential impacts presented in **Chapter 4** were calculated for the entire proposed ROW. The actual acreage of proposed impacts would be less since vegetation within the ROW would remain in place to the extent feasible and practicable in order to minimize impacts to soils and reduce erosion. The use of silt fences and other erosion control measures during construction would prevent erosion of native soils and reduce the runoff of soil particles into area streams. Furthermore, implementing revegetation of native species along constructed corridors would help prevent future erosion after construction; thereby increasing the success rate of any and all vegetation.

To the maximum extent possible and where required, material excavated from the road cuts would be used as fill material. If suitable soils are not found within the ROW, they would be obtained from other sites within a reasonable haul distance of the project. Detailed investigation of soils for construction would be conducted during final design of the preferred alternative.

Soil erosion and sedimentation would be minimized by the use, where practicable and feasible, of a combination of any of the following generally recommended methods. Other best management practices not specifically identified below may be appropriate to address unanticipated site conditions:

- Limit the surface area of unprotected, erodible soil exposed to erosion at any one time during construction activities. Stage clearing of vegetation as needed to keep pace with construction, rather than clearing far in advance.
- Upgrade unstable ground underlying the proposed action by means of various engineering activities:
  - The addition of extra sub-base materials to buffer the paved roadway from effects of shrinking and swelling ground;
  - Lime-stabilization; and
  - Avoidance of cut or fill slopes greater than ten degrees. Where such slopes are unavoidable, other means of protection may be required such as geotechnical fabrics, reduction of top-slope loads, and/or shoring of the toe of the slopes.
- Revegetate disturbed areas as soon as possible using nature's seasonal cycles to an advantage.
- Use native plant species, particularly long-lived, rapid growing species requiring a minimum of maintenance. Weedy species such as King Ranch bluestem and buffelgrass should not be used as they become invasive to natural areas outside the ROW.
- Limit duration of exposure of soils to erosion to the shortest possible time.
- Stage mulching and seeding to closely follow the progression of construction operations, particularly on high cuts and fills.
- Protect native vegetative cover (where active construction is not required) from equipment traffic and personnel parking. Natural vegetative areas not destined for active construction should be clearly marked as equipment-free areas. All construction personnel should be clearly instructed in the identification and restricted use of equipment-free areas.
- Coordinate construction activities to provide the least interference with agriculture operations.
- Reduce volume and velocity of construction runoff.
- Utilize temporary measures such as berms, dikes, dams, sediment basins and slope drains to control surface drainage.
- Construct earth or brush berms along the top and/or bottom edges of embankments to intercept runoff during construction.
- Utilize temporary slope drains to carry runoff from cuts and embankments to the bottom of slopes.
- Complete permanent drains and slope protection at the earliest practical time.
- Stabilize permanent soil berms by placing rock rubble on the downslope side, further reducing loss of soil moisture.
- Mulch and/or chipped vegetation may be used to reduce soil erosion on slopes, newly constructed embankments, and revegetated areas.

Temporary and permanent erosion control measures would be coordinated to ensure the best possible control during the construction and post-construction period. Permanent erosion control features would be installed at the earliest practicable time.

7.2.2 Farmlands

All reasonable alternatives cross soils and geology similar in nature, including some portions of prime farmland soils. While these impacts (i.e., removal of topsoil, compaction and removal of vegetation) do cause temporary to permanent loss to these resources, they are considered minor as rated and scored by the Natural Resources Conservation Service (NRCS). Therefore, mitigation measures for permanent loss of farmlands are not required. Mitigation measures to be implemented during and after construction for temporary soil impacts, including erosion control measures, are considered prudent and positive in helping to restore a portion of these same resources. As noted in **Section 7.1.2**, TxDOT also provides assistance to businesses and farms.

7.3 AIR QUALITY

The proposed 2nd Access Project is located in Cameron County, which is in attainment of all NAAQS; therefore, the transportation conformity rule does not apply. Local planning documents prepared for the project area emphasize the need for increased mobility and economic development of the region. The proposed project is included in the *Town of South Padre Island, Texas, Comprehensive Plan* (Town of South Padre 2008) and the *Cameron County Regional Mobility Authority Strategic Plan, 2007-2011* (**Appendix C**) (Cameron County Regional Mobility Authority 2006).

The proposed project is not located within an urbanized area or within the boundaries of a Metropolitan Planning Organization; therefore, it is not included in a Metropolitan Transportation Plan. Because the project is currently unfunded and planned for letting beyond the current Statewide Transportation Improvement Program timeframe, the project is not currently included in the *FY 2011-2014 Statewide Transportation Improvement Program*. However, it is anticipated that the proposed project would be included in a future Statewide Transportation Improvement Program.

Potential projects in the vicinity of this project included in the *CCRMA System Map* (CCRMA April 2008) that are anticipated to have an effect on mobility in the county are:

- West Loop (West Parkway) – construct four lanes within the existing Union Pacific ROW;
- U.S. Highway (US) 77 – upgrade facility from Corpus Christi to Brownsville;
- FM 509 – new location extension from US 77 to FM 508/FM 509 intersection;
- East Loop – new location bypass around Brownsville to the east;
- SH 550 – limited-access toll facility on new location from approximately 0.7 mile north of FM 3248 to SH 48;
- Port Entrance Road – improved entrance to the Port of Brownsville entrance;
- Outer Loop – from US 77 north of the Harlingen airport to the 2nd Access Project study area; and
- North Rail Relocation – new rail line in western Cameron County.

During the construction phase of the project, temporary impacts on air quality include additional dust generated from construction activities. Efforts would be made to mitigate for temporary air quality impacts during construction, including minimizing or eliminating unnecessary idling of construction vehicles and employing a combination of dust control techniques including watering of unpaved road surfaces, chemical stabilization and vehicle speed reduction.

7.4 NOISE

A detailed traffic noise analysis, including associated noise abatement measures for the preferred alternative, will be included in the final environmental impact statement. Noise associated with the construction of the project is difficult to predict. Heavy machinery (a major source of noise in construction) is constantly moving in unpredictable patterns. Provisions would be included in the plans and specifications that require the contractor to make every reasonable effort to minimize construction noise where warranted, through abatement measures such as work-hour controls and proper maintenance of muffler systems.

7.5 WATER QUALITY

7.5.1 Surface Water Quality Mitigation

Long-term operation of the facility would likely produce changes in the quantity and quality of the runoff from the paved roadway. Grass-lined swales have been shown to be an effective and low-maintenance mitigation measure to cleanse highway runoff. In combination with storm water management ponds, the grass-lined swales would collect and treat runoff from the highway. Therefore, grass-lined swales and storm water management ponds would be used to minimize the adverse effect of highway runoff to surface water quality.

Since the project would impact greater than 5 acres of land, a notice of intent would be prepared and filed with the Texas Commission on Environmental Quality (TCEQ) and U.S. Environmental Protection Agency (EPA) (40 CFR 122) prior to the issuance of a Texas Pollution Discharge Elimination System construction storm water discharge permit as per Section 402 of the Clean Water Act. The Texas Pollution Discharge Elimination System permit requires completion of a Storm Water Pollution Prevention Plan (SW3P) in order to avoid adverse impacts potentially resulting from construction storm water runoff discharges. TxDOT has its own storm water management guidelines and best management practices for construction activities that would be used in the development of the SW3P. The project SW3P would be prepared pursuant to the TxDOT manual, *Storm Water Management Guidelines for Construction Activities* (TxDOT 2000). A SW3P would be prepared prior to construction and followed throughout the construction phases to minimize the discharge of sediment laden storm water to the proposed project area streams. The SW3P may include, but is not limited to, the use of silt fences, erosion control logs, inlet protection barriers, hay bales and seeding or sodding. As part of the SW3P, TxDOT staff or a designee would be required to inspect both stabilized and unstabilized areas of the construction site for evidence of, or the potential for, pollutants entering waters of the U.S. via storm water runoff through a drainage system. Summary reports of these inspections would be written and retained as part of the SW3P. Once construction has been completed and the disturbed areas achieve 70 percent stabilizing cover, a notice of termination would be filed per permit requirements. No other source discharges that may require additional authorizations under Section 402 of the Clean Water Act are anticipated at this time.

Mitigation for impacts listed previously would incorporate the following best management practices at appropriate stages during construction. To the extent feasible, temporary erosion control measures would be installed prior to ground disturbing activities and maintained regularly throughout the various phases of construction. The erosion control plan would be phased to coincide with construction activities to ensure maximum protection throughout the construction process. At the completion of construction, the TxDOT *Seeding for Erosion Control* specifications would be followed to restore and reseed all disturbed areas. For erosion control, sod would be utilized and remain in place until the area has been stabilized. For sedimentation control, a combination of silt fencing, erosion control logs, and hay bale dikes would be utilized

and would remain in place until project completion. The existing ditches would be used for retention storage during construction. For post-construction best management practices, a combination of retention and vegetative filter strips would be utilized to control total suspended solids after construction. Vegetation within the existing ditches would be reestablished after construction and would act as vegetative filter strips. Other areas of ROW would be seeded with native species of grasses, shrubs or trees, as needed.

7.5.2 Groundwater Mitigation

Avoidance and minimization of impacts to the public and private water supply wells would be performed during preliminary and final design of the project. Measures would include minor alternative shifts to minimize impacts to source water protection areas and/or avoid direct impacts to the public and private water supply wells. Any water supply wells affected by construction would be mitigated using measures such as providing a new well or connection to the public water system, if feasible. Wells taken out of service would be sealed in accordance with the specifications outlined by the Water Well Drillers Advisory Council (Texas Department of Licensing and Regulation 2007).

A storm water management plan would be developed according to FHWA and TxDOT criteria to reduce the risk of contaminating local groundwater. The storm management basins would collect and control spills of hazardous materials, sediments and other particulates found in highway runoff. The use of established best management practices would be employed to prevent highway storm water runoff from entering the groundwater at wellheads. An emergency spill control pollution prevention plan would be developed and coordinated with local officials for the preferred alternative. Special storm water management measures would be designed to isolate potentially hazardous spills, for treatment and removal, before entering the groundwater resources. The best management practices listed in the previous section would be considered and incorporated into the plans during the preliminary and final design of the project.

7.6 WETLANDS AND VEGETATION COMMUNITIES

7.6.1 Waters of the U.S., Including Wetlands Permitting/Regulation

Implementation of any of the reasonable alternatives would require a Section 404 permit, Section 401 water quality certification and an appropriate mitigation plan. Under provisions of Section 402 of the Clean Water Act, the proposed project would also require a Texas Pollutant Discharge Elimination System construction storm water discharge permit and completion of a SW3P and notice of intent.

Impacts to jurisdictional waters of the U.S., including wetlands, associated with construction of the proposed project appear unavoidable with each of the reasonable alternatives. Each of the reasonable alternatives would result in some level of impact to waters of the U.S. (refer to **Chapter 4** for discussion and locations of potential adverse impacts).

Currently, the U.S. Army Corps of Engineers (USACE) Galveston District provides jurisdictional determination guidance on whether an area is adjacent or isolated in the context of the USACE Regulatory Program. The USACE Galveston District interprets “isolated waters” to be any body of water not located within the 100-year floodplain or otherwise connected to the surface tributary system, surface water connections, continuous wetland system, ditch or water course that carries water from a body of water to navigable waters, or waters that are part of a surface tributary system during normal expected flows. Based on this approach, the USACE Galveston District would make permit decisions on direct impacts to jurisdictional wetlands based on their

Section 404 authority, and the regulatory definitions of a wetland, with consideration given to direct impacts, and other natural resources.

A USACE Section 404 individual and/or nationwide permit would be required. The permit(s) and associated mitigation plan(s) would take into account recommendations and suggestions made during the agency coordination meetings. Those impacts that cannot be avoided would be minimized and appropriately mitigated per coordination with the USACE and other appropriate state and federal agencies and in accordance with Section 404 permit requirements. Please refer to **Section 7.19** for preliminary wetland mitigation commendations.

Water quality certification from the TCEQ would also be necessary prior to filling wetlands. The USACE would initiate the Water Quality Certification for permit applicants. However, applicants may negotiate directly with the TCEQ staff to address issues regarding Section 401 Water Quality Certification. A Clean Water Act Section 404 permit that disturbs more than 3 acres of waters of the U.S. is subject to individual review by the TCEQ as Tier 2 project impacts.

The Texas General Land Office may also require a lease for impacts to state-owned submerged lands.

The TPWD may require a transplant permit for authorized mitigation involving the transplant of aquatic vegetation, including seagrasses.

7.6.2 Navigable Waters of the U.S.

Navigable waters of the U.S. are those waters that at some time, in the past, present or future are used to transport interstate or foreign commerce. The General Bridge Act of 1946 (formerly Section 9 of the Rivers and Harbors Act of 1899) empowers the U.S. Coast Guard to regulate the construction of bridges and causeways within or across navigable waterways. Section 10 of the Rivers and Harbors Act of 1899 empowers USACE to regulate all work on structures in or affecting the course, condition or capacity of a navigable water of the U.S. The proposed project lies within the jurisdiction of the U.S. Coast Guard and USACE. Cameron County Regional Mobility Authority (CCRMA) and the TxDOT Pharr District would submit a bridge permit application and coordinate with the U.S. Coast Guard and USACE to obtain approval.

The following mitigation measures would be utilized to minimize adverse effects to navigable waterways:

- Proposed project activities would not cause more than minimal adverse effects on navigation. Clearances and general features of the bridge structure would be coordinated with the U.S. Coast Guard and USACE.
- The proposed project would be properly maintained to ensure public safety.
- Appropriate soil erosion and sediment controls would be utilized and maintained in effective operating condition during construction and all exposed soil and other fills, as well as any work below the ordinary high tide line, must be permanently stabilized at the earliest practicable time.
- Proposed project activities would not substantially disrupt the necessary life-cycle movements of those species of aquatic life indigenous to the Laguna Madre, including those species that migrate through the area.
- Heavy equipment working in wetlands would be placed on mats.

7.6.3 Waters of the U.S., Including Wetlands Mitigation

Every effort has been made to avoid and minimize wetland impacts, both adjacent and isolated, to the extent practicable during the planning process. This effort would continue up to construction of the proposed project. Avoidance measures would also likely include spanning major drainages along the preferred alternative.

Preliminary mitigation options include on-site mitigation and off-site mitigation. On-site mitigation (i.e., immediately adjacent to the proposed project) may include creation or enhancement of wetlands within the final project ROW, which would primarily involve development of shallow wetlands very similar in function and value to the wetlands impacted during roadway construction.

On-site mitigation for highway projects may not be considered adequate for replacement of all lost wetland functions and values; therefore, on-site mitigation would not be considered as the only source of wetland mitigation for impacts associated with this project. On-site mitigation may be considered as a supplement to additional off-site mitigation. Further coordination with the U.S. Fish and Wildlife Service (USFWS), Texas Parks and Wildlife Department (TPWD) and the USACE may completely discard the use of on-site mitigation as an option for this project, especially in light of better off-site mitigation options that adequately compensate for impacts to wetland functions and values.

Off-site mitigation projects for wetlands must be designed to reestablish, to the extent reasonable, similar wetland functions, values and types as the pre-existing site. Off-site mitigation would be conducted in the same geographic vicinity or in proximity, and most likely may include expanding existing wetlands, restoration with hydrophytic species, or regulating water levels in impoundments or streams.

Where possible, wetland mitigation would consider other environmental resources in an effort to provide a comprehensive ecosystem level approach to mitigation. Wetland locations and mitigation measures (that meet the regulatory requirements) would be considered that also offer enhanced benefits to regional hydrology, water quality, wildlife habitat and/or air quality. These measures may include the establishment of riparian habitat that would also provide habitat for the endangered ocelot, a series of water filtration wetlands to improve water quality, or the construction of wetlands in areas that contribute to blowing dust and sand.

The compensatory mitigation could also include the creation of wetland habitats to compensate for the direct loss or function of wetlands impacted by the project.

Natural resource agencies (including TPWD, USFWS, USACE, EPA, and TCEQ) would be involved in decisions regarding appropriate mitigation ratios and the location, size and character of the mitigation. A compensatory mitigation plan would be submitted to the USACE as part of the Section 404 permit review process. The mitigation plan would include a discussion of the avoidance and minimization measures used in the routing and design of the roadway. In addition, the plan would include specifications for accomplishing the proposed compensatory mitigation measures. It is anticipated that a monitoring program would be included in the mitigation plan to ensure the successful implementation of the compensatory mitigation measures. The approved mitigation plan would be a condition of the USACE Section 404 permit for the proposed project. The approved mitigation plan would provide a detailed discussion of mitigation commitments, including those that must be implemented during

construction. Mitigation measures for site-specific activities would be identified, to the extent practicable, throughout project development as additional information becomes available.

Overall wetland impacts of the reasonable alternatives ranged from approximately 129.81 acres to 243.63 acres. Alternative 10 was determined to have the least overall impact. Alternative 9 was determined to have the highest overall impact. Wetland impacts would be mitigated at a ratio determined by the quality of wetlands to be impacted. Typically these ratios have ranged from 2:1 for low quality wetlands, 4:1 for medium quality wetlands, to 6:1 for high quality wetlands. The USACE would make the final determination of mitigation required for the proposed project, once a preferred alternative is selected. In summary, several viable wetland mitigation alternatives would be investigated and evaluated in the mitigation plan. The technical and regulatory merit of the mitigation recommendations would be evaluated and further discussed with resource agency staff and ultimately the public throughout development of the final environmental impact statement and prior to issuance of a record of decision.

7.6.4 Habitat Mitigation – Regulatory

Mitigation includes measures to avoid, minimize and/or compensate for unavoidable losses to resources that cannot be further minimized. The assessment of mitigation measures (avoidance, minimization and compensation) is an integral part of the NEPA process. The preferred means of mitigation is avoidance, which is inherent in impact evaluation analysis and alternative development/assessment. For those adverse impacts that cannot be avoided, other mitigation efforts must be considered. These efforts include minimization of potentially adverse impacts and compensation for those remaining adverse impacts that cannot be further reduced.

For instance, an area void of a seagrass community could be developed in such a manner as to provide the hydrology, sediment and water quality to support the establishment of a seagrass bed. The reestablishment of seagrass in propeller scarred areas would improve the seagrass habitat by restoring the bed to its original condition. The mitigation ratio for the compensation of direct impacts is anticipated to be 3 acres of mitigation for every acre of disturbance. The mitigation plan could also include compensating for loss of seagrass production attributed to potential shading issues resulting from the proposed project. The loss of production could be assessed utilizing a modified light-driven model to estimate seagrass production (Burd and Dunton 2001). Modeled loss of production is anticipated to be mitigated at a one to one ratio. Other mitigative measures such as public education/outreach, signage or the establishment of protection areas could also be incorporated into the mitigation plan.

Initial mitigation measures in the planning or alignment of highway projects minimize the probable occurrence of habitat (vegetative communities) and wetland impacts (both adjacent and isolated) through route location (avoidance) and construction practices. Activities to minimize the impacts to habitats from highway construction include: minimizing devegetation of the construction area wherever safety allows, decreasing the amount of fill placement, and implementation of best management practices, including an erosion and sedimentation control plan. Specific impact minimization to wetland areas may include: the roadway design (use of bridge crossings instead of filling embankment); the use of retention basins and revegetated swales to minimize runoff, sedimentation, turbidity, leaching of soil nutrients and leaching of chemicals from petroleum products, pavement and waste material; and maintaining flow patterns to ensure wetland hydrology in spite of roadway design requirements.

The fact that some degree of impact is often unavoidable, regardless of the care applied during the planning, design and construction of a roadway, a plan for compensatory mitigation to

replace functions, values and features or habitat that may be disturbed would be required. On occasion, on-site restoration of degraded wetland habitat or creation of wetland habitat within the highway ROW through creative use of detention basins, borrow pit areas or drainage runoff channels may be appropriate. Where such measures may not effectively restore resource functions and values, off-site mitigation measures may be considered.

7.6.5 Habitat Mitigation – Non-Regulatory

Non-regulated, non-wetland resources (i.e., dense thorn-scrub and riparian habitats) identified as environmentally sensitive, socially desirable or ecologically valuable have been avoided to the extent practicable. Non-regulated resources are often included as part of a wetland mitigation plan, on a case-by-case basis.

In accordance with Provision (4)(A)(ii) of TxDOT's Memorandum of Understanding with TPWD signed in 1998 and at the TxDOT district's discretion, habitats given consideration for non-regulatory mitigation during project planning include:

- Habitat for federal candidate species (impacted by the project) if mitigation would assist in the prevention of the listing of the species;
- Rare vegetation series (S1, S2, or S3 TPWD designations) that also locally provide habitat for state-listed species;
- All vegetation communities listed as S1 or S2, regardless of whether or not the series in question provides habitat for a state-listed species;
- Bottomland hardwoods, native prairies, and riparian sites; and
- Any other habitat feature considered to be locally important that the TxDOT district chooses to consider.

In accordance with the Executive Memorandum of August 10, 1995, all agencies shall comply with NEPA as it relates to vegetation management and landscape practices for all federally assisted projects. The Executive Memorandum directs that where cost-effective and to the extent practicable, agencies would 1) use regionally native plants for landscaping; 2) design, use, or promote construction practices that minimize adverse effects on the natural habitat; 3) seed to prevent pollution by, among other things, reducing fertilizer and pesticide use; 4) implement water-efficient and runoff reduction practices; and 5) create demonstration projects employing these practices. Landscaping included with this project would comply with the Executive Memorandum and the guidelines for environmentally and economically beneficial landscape practices.

In accordance with Executive Order 13112 on Invasive Species and the Executive Memorandum on Beneficial Landscaping, landscaping would be limited to seeding and replanting the ROW with native species of plants, where possible. A mix of native grasses and native forbs would be used to revegetate the ROW, as available.

Mitigation alternatives associated with on-site mitigation and off-site mitigation would continue to be investigated and evaluated by CCRMA, TxDOT, TPWD, USFWS and USACE. Replacement of values for unregulated habitat (habitat not under USACE jurisdiction where compensation can be required) within transportation corridors and highway ROW may not always be practicable, feasible or safe.

A compensatory mitigation plan would be submitted to the USACE as part of the Section 404 permit review process. It is anticipated that a non-wetland component would be incorporated, at

the discretion of the TxDOT district, into the mitigation plan that protects, enhances and preserves the integrity of the natural environment.

7.7 WILDLIFE

Wildlife relocating from within the project area because of the loss of habitat would move into established territories of other wildlife that are theoretically maintaining population numbers at carrying capacity. The stressors and impacts to wildlife associated with the emigration of individuals from the project area would be greater during times of drought or when carrying capacity of the population within the area is already exceeded. The increased stressors would lead to an increase in mortality and/or a decrease in recruitment due to the limited resources available within adjacent habitats. Depending on the longevity and fecundity of the species, the effects of the relocated wildlife would be temporary as the carrying capacity equilibrium is reestablished. Initial mitigation measures in the planning process of the project minimized the probable occurrence of prime habitat (vegetation communities) and wetland impacts through careful consideration of the alternatives (avoidance). However, construction of the project would impact vegetative communities that provide wildlife habitats. It is anticipated that a non-wetland component would be included in the mitigation plan to compensate for impacts to non-regulated natural resources.

Impacts to wildlife and habitat resources can be minimized through the use of a combination of any of the following generally recommended methods or other best management practices not specifically identified below, but that may be appropriate to address unanticipated site conditions:

- Minimize the crossing of flowing streams and utilize bridge spans (as opposed to fill) to the greatest extent to minimize impacts on riparian and aquatic communities.
- Have the ROW surveyed to identify significant wildlife areas, high quality vegetation and sensitive features such as caves, springs and colonial nesting areas.
- Intersections of wildlife travel corridors and the proposed roadway can be fenced to divert wildlife along the ROW to culverts, bridge spans or wildlife crossings where passage can be safely made.
- Limit the use of herbicides and other chemicals for ROW maintenance.
- In accordance with Executive Order 13112 on Invasive Species and Executive Memorandum on Beneficial Landscaping, landscaping would be limited to seeding and/or planting of the ROW with native species of grasses, shrubs or trees. Soil disturbance would be minimized to ensure that invasive species would not establish in the ROW.
- Schedule mowing for ROW maintenance to facilitate the natural reseeding of indigenous spring and autumnal herbaceous communities.
- Minimize the use of construction haul work roads and minimize construction traffic impact areas. Work road areas would be restored following construction to as good as or better than conditions that existed prior to construction.
- Because of safety requirements, no trees can be left within 30 feet of the roadway without roadside protection. Trees outside of this safety zone, which are not affected by construction, would be preserved.
- If nesting or wintering migratory bird species or rookeries are identified on or along the route, deferring especially loud or noisy activities in the adjacent areas until after the birds have left the area would reduce negative impacts to these species.

Coordination with the appropriate resource agency would be initiated should wildlife and habitat or sensitive natural resource areas, as defined by the TPWD Memorandum of Understanding, be encountered during construction.

Efforts would be made during construction to avoid the inadvertent take of migratory birds, their occupied nests, eggs, and/or young. Active nests would not be removed from bridges, trees, ground, or other structures during bird nesting season (February 1 to November 1). Prior to performing any work in the ROW during the nesting season, a survey would be conducted to determine if active nests are present. If active nests are present, a minimum 25-foot buffer would be maintained around the nest site until the young have fledged or the nest has been abandoned.

7.8 THREATENED AND ENDANGERED SPECIES

The Endangered Species Consultation Handbook (USFWS 1998) developed under Section 7 of the Endangered Species Act states that Section 7 requires minimization of the level of take for threatened and endangered species. However, the USFWS provides nondiscretionary reasonable and prudent measures that are necessary to minimize the impact of incidental take. During Section 7 consultation, a biological assessment will be submitted to the USFWS. If the proposed project would potentially impact threatened or endangered species and is determined to jeopardize threatened and endangered species, reasonable and prudent measures would be identified in the incidental take permit. Additionally, coordination with the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) will be conducted during the Section 7 consultation process for potential impacts to marine mammals. If it is determined that incidental take would potentially occur, the proposed project would require an Incidental Harassment Authorization from NOAA Fisheries.

Through the process of establishing the reasonable alternatives, the first two steps of mitigation have been implemented. Habitat utilized by threatened and endangered species was avoided, where possible. The levels of unavoidable impacts were minimized by the adjustment of specific alternatives as far away from potential habitat as possible.

For unavoidable impacts, including construction impacts to ocelot/jaguarondi, Northern Aplomado Falcon, or Piping Plover habitat, an ecosystem level, comprehensive mitigation approach would be used to compensate for impacts to threatened and endangered species, including the state-listed species shown in **Table 4-34**. This approach would be utilized to ensure that any compensative efforts would not only locally benefit the species, but would benefit the ecosystem as a whole. These compensation methods could occur utilizing several different methods.

For the ocelot, wildlife crossings could be utilized to minimize wildlife/vehicle collisions along specific existing travel corridors. These wildlife crossings would not only benefit the endangered ocelot, but would also provide connectivity within travel corridors for other wildlife species. The project team has informally coordinated with the USFWS throughout the planning process and has committed to providing wildlife crossings and other appropriate mitigation. Specific details of the wildlife crossings and aspects of the mitigation plan pertaining to threatened and endangered species will be formulated in cooperation with the USFWS and formalized during the Section 7 consultation process. Through the collaborative planning process, USFWS would provide input regarding placement, dimensions for each crossing, and analysis of individual crossing functionality/usefulness based on habitat availability and connectivity at each crossing

site. Crossing design could include land acquisition or easements, where necessary, to provide protected access to crossings.

Impacts to threatened and endangered species, including the ocelot, jaguarundi, Piping Plover, Northern Aplomado Falcon and the state-listed species that may be impacted by the proposed project (see **Table 4-34**), could also be compensated by the acquisition and/or restoration of lands not currently under the control of the resource agencies, but that would benefit the species by increasing the protected habitat or increasing the quantity and/or quality of habitat. These efforts could be accomplished by purchase of either the land or the development rights through a conservation easement. The purchase of property or the development rights could be used to offset unavoidable impacts to the critical habitat of the piping plover. Critical habitat to the north of the project area under private ownership would be a viable opportunity for such a compensation effort. Additionally, property that is currently cultivated or heavily grazed could be purchased and the native dense brush could be restored to benefit the ocelot and other wildlife species dependent on this habitat. Mitigation ratios would be determined through coordination with the USFWS and TPWD.

For Brown Pelicans, a warning system similar to the one on the Queen Isabella Memorial Causeway would be included in the project design to notify drivers of the potential risk of pelican strikes during windy conditions.

Artificial lighting would be limited to the bridge structure, intersections and other locations when required for safety. Low-impact artificial lighting would be used to minimize potential lighting encroachment effects to wildlife, especially sea turtles. Directional, shielded light fixtures that focus illumination downward to the roadway surface while minimizing lighting of the surrounding area would be incorporated into the final design.

During project construction, if any threatened or endangered species is observed, work would cease in the immediate vicinity and TxDOT would be notified immediately. TxDOT would then initiate any required consultation with the USFWS.

7.9 FLOODPLAINS

A location hydraulic study would be performed during the final design of the highway. The study would provide detailed hydraulic information necessary to determine the use of culverts or a bridge at each stream crossing. The structures would be designed according to FHWA and TxDOT standards. The study would be reviewed by local, state and federal regulatory agencies to confirm that adequate measures have been taken to ensure that floodplain encroachment does not increase the risk of flooding to adjacent properties. Areas sensitive to local flooding would be identified during the final design phase of the project. If areas of severe flooding are identified, design criteria may be more restrictive than those specified in county orders. Any proposed construction within the 100-year floodplain or floodway would be coordinated with the Cameron County floodplain administrators to receive a development permit.

The reasonable alternatives were designed to avoid impacts to floodplains to the maximum extent feasible and practicable. All reasonable alternatives were located to minimize encroachment on regulatory floodways and floodplains and maintain transverse encroachments to the extent possible. All floodways would be bridged by the preferred alternative, and further avoidance and minimization of floodplain encroachments would be considered during preliminary and final design of the preferred alternative. Mainland access points to the proposed project would be located outside of the floodplains to the greatest extent practicable to

minimize the potential for future floodplain development. Avoidance of floodplain impacts would not be possible on the South Padre Island; the island is almost entirely within the 100-year floodplain. The proposed project is not anticipated to create a significant encroachment on any area floodplains as defined in 23 CFR 650.

Mitigation measures may include cross drainage structures or long bridge structures to allow sheet flow to be unchanged relative to existing conditions. Hydraulic structures would be designed pursuant to TxDOT and FHWA standards to accommodate periods of high flows without impacting downstream areas. Adverse impacts to the watershed are expected to be negligible. Mitigation of impacts would include best management practices during construction of detention facilities to offset increased flows.

Cross drainage and mitigation facilities associated with the proposed roadway and drainage improvements would be designed to handle a 100-year flood event without affecting the 100-year floodplain. The hydraulic design practices of the proposed project would be in accordance with current TxDOT and FHWA design policies and standards. The proposed project would not increase the base flood elevation to a level that would violate applicable floodplain regulations or ordinances.

7.10 COASTAL BARRIERS

Potential impacts to coastal barrier resources were mitigated through avoidance of the resource. Coastal barrier resource lands were considered a fatal flaw in the alternative development process and no lands would be impacted as the result of the project. Therefore, no further mitigation is proposed for coastal barrier resource lands.

7.11 COASTAL ZONE MANAGEMENT

The Coastal Coordination Council is the agency responsible for planning and regulation of land and water uses in the Texas Coastal Zone, consistent with the Coastal Management Plan. The goals of the Texas Coastal Management Plan (Texas Administrative Code, Title 31, Part 16, Chapter 501, Subchapter B Rule Section 501.12) are:

- To protect, preserve, restore and enhance the diversity, quality, quantity, functions and values of coastal natural resource areas;
- To ensure sound management of all coastal resources by allowing for compatible economic development and multiple human uses of the coastal zone;
- To minimize the loss of human life and property due to the impairment and loss of protective features of coastal natural resource areas;
- To ensure and enhance planned public access to and enjoyment of the coastal zone in a manner that is compatible with private property rights and other uses of the coastal zone;
- To balance the benefits from economic development and multiple human uses of the coastal zone, the benefits from protecting, preserving, restoring and enhancing coastal natural resource areas, the benefits from minimizing loss of human life and property, and the benefits from public access to and enjoyment of the coastal zone;
- To coordinate agency and subdivision decision-making affecting coastal natural resource areas by establishing clear, objective policies for the management of coastal natural resource areas;
- To make agency and subdivision decision-making affecting coastal natural resource areas efficient by identifying and addressing duplication and conflicts among local, state and

federal regulatory and other programs for the management of coastal natural resource areas;
- To make agency and subdivision decision-making affecting coastal natural resource areas more effective by employing the most comprehensive, accurate and reliable information and scientific data available and by developing, distributing for public comment and maintaining a coordinated, publically accessible geographic information system of maps of the coastal zone and coastal natural resource areas at the earliest possible date;
- To make coastal management processes visible, coherent, accessible and accountable to the people of Texas by providing for public participation in the ongoing development and implementation of the Texas Coastal Management Plan; and
- To educate the public about principal coastal problems of state concern and technology available for the protection and improved management of coastal natural resource areas.

Because the proposed project occurs within the coastal zone management area, coordination with the Coastal Coordination Council would be required. A Federal Consistency Review would be conducted by the Texas General Land Office on behalf of the Coastal Coordination Council when construction occurs within the Texas Coastal Zone Boundary. The Texas General Land Office would review project plans to ensure that they meet the goals and policies of the Coastal Management Program to the maximum extent practicable. Project plans are submitted to the Texas General Land Office from the USACE.

In accordance with Title 31, Part 16, Chapter 501, Subchapter B Rule Section 501.31 the following mitigation measures would be incorporated into the mitigation plan:

- Pollution prevention procedures shall be incorporated into the construction and maintenance of the proposed project to minimize pollutant loading to coastal waters from erosion and sedimentation, use of pesticides and herbicides for maintenance ROW, and other pollutants from storm water runoff.
- The proposed project would be located at sites that, to the greatest extent practicable, avoid and otherwise minimize the potential for adverse effects from construction and maintenance of additional roads, bridges, causeways and other development associated with the project; and direct release to coastal natural resource areas of pollutants from oil or hazardous substance spills, contaminated sediments or storm water runoff.
- Where practicable, the proposed project would be located in existing ROW or previously disturbed areas, if necessary, to avoid or minimize adverse effects.
- Where practicable, the proposed project would be located at sites at which future expansion would not require development in coastal wetlands except where such construction is determined to be essential for evacuation in case of a natural disaster.
- Construction and maintenance of the project would avoid the impoundment and draining of coastal wetlands. If impoundment or draining cannot be avoided, adverse effects to impounded or drained wetlands would be mitigated.
- Construction of the proposed project would occur on sites and times selected to have the least adverse effects practicable on recreational uses of coastal natural resource areas and on spawning or nesting seasons or seasonal migrations of terrestrial and aquatic species.
- Beach-quality sand from the construction and maintenance of roadways adjacent to Gulf beaches would be beneficially used by placement on Gulf beaches, where practicable. Where placement on Gulf beaches is not practicable, the material shall be placed in critical dune areas.

7.12 ESSENTIAL FISH HABITAT

Construction impacts to essential fish habitat and managed species due to suspended sediments would be avoided and/or minimized by utilizing temporary silt curtains around the bridge support structures. While increased sedimentation cannot be completely avoided, minimizing the sediment load would minimize the effects on fish and benthic organisms down current.

7.13 ARCHEOLOGICAL RESOURCES

If any archeological sites are determined to be eligible for listing in the National Register of Historic Places (NRHP) and would be affected by the proposed project, appropriate consultation would occur to resolve potential adverse effects. Section 106 and Antiquities Code review and consultation will proceed in accordance with the First Amended Programmatic Agreement among the FHWA, TxDOT, the Texas State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Implementation of Transportation Undertakings, as well as the Memorandum of Understanding between the THC and TxDOT.

In the event archeological artifacts are found during project construction, work in the immediate vicinity would cease and TxDOT would be contacted immediately, TxDOT would then initiate any required coordination with the Texas Historical Commission.

7.14 NON-ARCHEOLOGICAL HISTORIC RESOURCES

FHWA's NEPA implementing regulations call for the consideration of mitigation for all adverse impacts. Mitigation should be considered for any impact to a historic-age resource either listed in or eligible for listing in the NRHP.

For the proposed project, there are no historic-age resources within the area of potential effect previously listed in or recommended eligible for listing in the NRHP. As a result, there are no resources for which the proposed project would have a direct, indirect or cumulative impact. Therefore, consideration of mitigation is not required for this project.

In the event non-archeological historic resources are found during project construction, work in the immediate vicinity would cease and TxDOT would be contacted immediately, TxDOT would then initiate any coordination with the Texas Historical Commission.

7.15 HAZARDOUS MATERIALS

No documented federal or state regulated hazardous materials sites were identified within the American Society for Testing and Materials 1527-05 search distances of any of the build alternatives. If an undocumented site is encountered during construction, a detailed evaluation would need to occur. Mitigation, if warranted, would depend on the type, size and location of the encountered hazardous materials.

7.16 VISUAL AND AESTHETIC

It is likely that visual changes resulting from the proposed project would occur across the Laguna Madre and near intersections where access to the new roadway would be provided. These developments would likely include streetlights and/or security lighting that would be expected to result in incremental and localized increases in ambient light levels, glare and nightglow. Where practicable, visual mitigation measures could include naturally vegetated medians, minimized ROW clearing, incorporation of design specifications to blend into the

landscape, and promotion of roadside native wildflower planting programs. Native plants would be considered for roadside vegetation, where practicable, to improve the visual aesthetics and to control the introduction and growth of invasive species, landscape planting and revegetation of natural areas impacted by construction. As currently proposed, the roadway lighting system would be restricted to those areas where intersections, tolling facilities and the bridge structure are located and would consist of low impact, downward directional lighting.

The design of the facility would follow TxDOT's Green Ribbon Project. The Green Ribbon Project provides TxDOT with guidelines to integrate environmental and aesthetic issues with roadway functionality and is applicable to all TxDOT roadways within the Pharr District. Five primary design principles guide the Green Ribbon Project enhancement concepts:

- Green First: When considering enhancements, planting would be priority number one.
- Integration: Consider all improvements in context with each other. Solutions should emphasize the visual, as well as physical, integration of all components.
- Continuity: Improvements should create a continuous appearance.
- Freeways are Public Space: The freeway ROW belong to the public and should provide a visually pleasing experience.
- Maintenance: All enhancements should consider ease of long-term maintenance.

7.17 ENERGY

Energy impacts are a function of several variables including average running speed, vehicle-miles of travel and the mix of vehicle types in the system. The reasonable alternatives could improve fuel efficiencies as traffic moves from the existing roadway network to the new facility, thereby improving traffic mobility (uniform speeds, less congestion) across the study area. No mitigation is proposed for energy uses within the project corridor; however, steps to increase energy efficiency of the project's construction and operation would be taken whenever applicable.

7.18 CONSTRUCTION IMPACTS

The contractor would be required to take every possible reasonable step and follow mitigation procedures in accordance with state and local governing regulations to avoid or minimize construction impacts (**Table 7-1**). Further, the contractor would be responsible for ensuring regulatory compliance pertaining to all project specific locations, such as construction staging areas, borrow sites, field office locations, etc.

Traffic delays would be minimized through coordination between TxDOT, contractors and affected neighborhoods or landowners (in areas immediately adjacent to the proposed ROW) and by developing a construction schedule that would allow for a minimum delay for movement across the proposed ROW. Also, efforts would be made to provide appropriate construction detours, informative signage and maintenance of access to residences, farms, businesses and community facilities where practicable. Construction of the reasonable alternatives could have additional impacts on potential hazardous material sites. However, risks can be minimized by conducting Phase I Environmental Site Assessments according to American Society for Testing and Materials standards to identify, avoid and mitigate hazardous material sites. If hazardous materials are found during the construction phase, TxDOT standard guidelines would be followed.

Table 7-1: Measures Required to Avoid or Minimize Construction Impacts

Construction Related Impact	Contractor Mitigation Measure(s)
Air Quality	Implementing dust control measures, such as the use of water sprinklers, and prohibiting open burning, except in accordance with applicable laws and regulations, would minimize impacts to air quality.
Water Quality	Preparation of SW3P pursuant to TxDOT guidelines (TxDOT 2002) including but not limited to berms, dikes, temporary seeding, sodding, sediment traps, erosion control logs, geotextile fiber mats, silt fences, hay bales, slope drains, mulches and crushed stone.
Waters of the U.S. (including Wetlands)	Implementing Best Management Practices, which would be included as part of the Section 401 Water Quality Certification of the Section 404 Individual Permit package, would minimize impacts to waters of the U.S., including wetlands.
Vegetation	Where feasible, the contractor would protect trees within the 30-foot safety zone of the roadway. Trees outside of this safety zone, which are not affected by construction, would be preserved.
Wildlife (including Migratory Birds and Threatened/Endangered Species)	In the event that migratory birds are encountered on-site during construction, every effort would be made to avoid adverse impacts to protected birds, active nests, eggs and/or young. If any state or federal threatened or endangered species are observed during construction, neither the species nor its habitat would be disturbed. Work would cease in the immediate area and the District Engineer would be contacted immediately.
Essential Fish Habitat	Placement of temporary silt curtains around the bridge support structures would minimize impacts to Essential Fish Habitat.
Noise	Shifting construction timings to daylight hours or any other "noise tolerant" period depending on the neighboring properties. Use of mufflers on construction equipment near residential areas.
Maintenance and Control of Traffic	Construction in a single geographic area would be limited to avoid inundating the adjacent communities with construction zones.
Health and Safety	Contractor would comply with all federal, state and local laws including Occupational Safety and Health Administration regulations governing safety, health and sanitation of construction personnel and general public.
Hazardous Materials	If necessary, Phase I Environmental Site Assessments would be conducted prior to construction. If hazardous materials are discovered during the construction phase, TxDOT standard guidelines would be followed.
Pollution control on haul roads, borrow/material pits, waste material disposal areas	Contractor to exercise combination of erosion and pollution control measures listed under air and water quality control.

Source: HNTB 2009

7.19 PRELIMINARY MITIGATION OPTIONS

As stated previous, the project sponsors (TxDOT and CCRMA) are committed to developing a comprehensive mitigation plan for the proposed project. The mitigation plan will be developed in cooperation with state and federal resource agencies and will be designed to mitigate for unavoidable project impacts in accordance with applicable requirements of state and federal law.

Preliminary mitigation options are currently being evaluated for each impacted environmental resource. Detailed discussions regarding these mitigation options with resource agencies will help formulate the comprehensive mitigation plan used for permitting the proposed project. The following table (**Table 7-2**) shows the direct impact for each resource and potential mitigation options currently being evaluated by the project team. The mitigation options and details will be developed further through more detailed studies of resources during the final environmental

impact statement and ongoing agency coordination. Indirect impacts from the proposed project will also be further evaluated and coordinated with resource agencies for mitigation consideration.

Table 7-2: Potential Mitigation Options

Environmental Resource	Range of Potential Direct Impacts (acres)		Potential Mitigation Options	Potential Mitigation Ratios*	Est. Acreage Needed*
Piping Plover Habitat	1.03 ac - 13.93 ac		• purchase of private land within Piping Plover habitat for state protection • purchase sub-optimal land adjacent to critical habitat • funding for agency to conduct research on Piping Plover abundance and habitat use	1:1 - 2:1	14 - 26 ac
Ocelot/Jaguarundi Habitat	4.79 ac - 119.34 ac		• wildlife crossings/fencing • acquisition of additional conservation land • acquisition of areas with appropriate soil types for conversion	4 wildlife crossings/fencing	To be determined
Aplomado Falcon Habitat	135.52 ac - 248.10 ac		• acquisition of additional conservation land • monitoring and nest construction within LANWR/other habitat	To be determined	To be determined
Manatee/Sea Turtle Habitat	72.75 ac - 113.26 ac		• in conjunction with seagrass and wetland mitigation	1:1 - 3:1	Included below
Wetlands (includes Essential Fish Habitat)	Forested/ Shrub	0.00 ac - 0.46 ac	• in conjunction with falcon habitat	2:1 for low quality 4:1 for medium quality 6:1 for high quality	1 ac
	Seagrass	21.40 ac - 47.94 ac	• seagrass planting • reestablishment in propeller scarred areas • public education/outreach • signage/establishment of protected areas	3:1 direct 1:1 indirect	121 ac unknown
	Freshwater	5.98 ac - 38.13 ac	• purchase of land for wetland creation • donation to agency restoration project	2:1 for low quality 4:1 for medium quality 6:1 for high quality	23 - 152 ac
	Saltmarsh	0.00 ac - 2.36 ac	• purchase of land for wetland creation • donation to agency restoration project	2:1 for low quality 4:1 for medium quality 6:1 for high quality	7 - 14 ac
	Mud Flats/Salt Flats	5.05 ac - 19.80 ac	• purchase of land for wetland creation • donation to agency restoration project	2:1 for low quality 4:1 for medium quality 6:1 for high quality	41 - 79 ac
	Open Water	68.78 ac - 73.64 ac	• purchase of land for wetland creation • donation to agency restoration project	1:1	68 - 73 ac
Vegetation Communities	Black Mangrove	0.00 ac - 0.13 ac	• at the District's discretion	3:1	.5 ac
	Riparian	0.20 ac - 8.87 ac	• at the District's discretion	3:1	16 - 26 ac
	Dune	0.00 ac - 50.32 ac	• in conjunction with Piping Plover habitat • use of construction materials for dune creation • donation to agency restoration project • requires Dune Protection Permit from Texas General Land Office	1:1	0 - 50 ac

*Preliminary estimates based on data presented in the DEIS and typical anticipated ratios for mitigation; however, further agency coordination/permitting will be needed to determine the final mitigation ratios, acreages needed, and monitoring requirements.

CHAPTER 8

AGENCY COORDINATION AND PUBLIC INVOLVEMENT

LIST OF TABLES

CHAPTER 8

AGENCY COORDINATION AND PUBLIC INVOLVEMENT

Agency coordination and public involvement is crucial to the successful delivery of transportation infrastructure projects. For this reason and in recognition of the size, scope and complexity of the proposed 2nd Access Project, a "context sensitive solution" approach was employed to engage resource agencies and the public in the project development process. Context sensitive solutions respond to both the physical "context" of the project and to the context of community values. Federal Highway Administration (FHWA) defines context sensitive solutions as:

> *". . . a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility. Context sensitive solution is an approach that considers the total context within which a transportation improvement project will exist."*

The context sensitive approach utilized for the proposed project was based on principles such as: engaging all stakeholders early and often during project development process; use of interdisciplinary teams; consideration of multi-modal solutions; achieving environmental stewardship; and promoting safe, efficient integrated solutions. This approach satisfies the requirements of the National Environmental Policy Act (NEPA) and Section 6002 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (23 USC Section 139) by proactively engaging agencies, stakeholders and the general public. FHWA is the lead federal agency. CCRMA and TxDOT are co-lead agencies.

This chapter serves to document the on-going agency coordination and public involvement activities undertaken in conjunction with development of the proposed 2nd Access project.

8.1 NOTICE OF INTENT

A notice of intent to prepare an environmental impact statement for the proposed 2nd Access Project was published in the *Federal Register* on April 23, 2008, and in the *Texas Register* on April 29, 2008. Copies of the notices of intent are included in **Appendix I-1 and I-2**.

8.2 PROJECT COORDINATION PLAN

A Project Coordination Plan was prepared to facilitate and document the roles and responsibilities of the Cameron County Regional Mobility Authority (CCRMA), the Texas Department of Transportation (TxDOT) and FHWA in the project development process. The Project Coordination Plan also outlined the structured process by which the lead agencies would interact with other agencies and with the public throughout the project development process. The Project Coordination Plan was prepared in accordance with requirements of Section 6002 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (23 USD Section 139).

The Project Coordination Plan identified potential participating/cooperating agencies for the proposed project. Cooperating agencies are defined as federal agencies with special expertise pertaining to the proposed project or which have jurisdiction by law. If a federal agency chooses to decline or does not respond to the invitation then the agency would be treated as a

participating agency. Participating agencies may include local, state and federal agencies with special interest in a proposed project.

The U.S. Fish and Wildlife Service (USFWS), the U.S. Coast Guard, the U.S. Army Corps of Engineers (USACE) and the National Ocean and Atmospheric Administration Fisheries Service (NOAA Fisheries) have jurisdiction over specific resources potentially impacted by the proposed 2nd Access Project and, at the invitation of the FHWA, are officially serving in a cooperating agency role. Some federal agencies that were invited to be a cooperating agency choose not to do so; therefore, the final lists of cooperating agencies differs slightly from the one presented in the approved Project Coordination Plan.

Participating agencies in the project development process include:

- Texas General Land Office
- Texas Parks and Wildlife Department (TPWD)
- Texas Historical Commission (THC)
- Texas Commission on Environmental Quality (TCEQ)

Representatives of the cities of Brownsville, South Padre Island, Harlingen, Laguna Vista, Los Fresnos, Port Isabel and Bayview have actively participated in the agency coordination and public involvement process.

A copy of the Project Coordination Plan, as approved by FHWA, can be found in **Appendix I-3.**

8.3 PROJECT SCOPING

Scoping for the proposed 2nd Access Project included a series of three public scoping meetings and an agency scoping meeting. The public scoping meetings were held at strategic milestones in the project development process and each meeting focused on a specific aspect of the alternatives development process.

8.3.1 Agency Scoping Meeting

An agency scoping meeting was held on May 22, 2008, at the South Padre Island Municipal Complex in South Padre Island, Texas. The agency scoping meeting was held in conjunction with the first NEPA Technical Working Group meeting. The purpose of the Agency Scoping meeting was as follows:

(1) To elicit input and comments from cooperating and participating agencies regarding the development of the need and purpose of the proposed project and identification of the boundaries of the study area;
(2) To elicit input and comments concerning the Project Coordination Plan;
(3) To allow agencies the opportunity to review the draft environmental constraints map and provide input;
(4) To answer questions concerning the proposed project;
(5) To allow the agencies to identify issues warranting consideration in the environmental impact statement; and
(6) To invite the agencies to participate on the NEPA Technical Working Group.

A total of 16 agencies and three interested individuals attended the meeting. Subsequent to the meeting, several agencies provided written comments. These written comments can be found

in **Appendix J-1**. A copy of the Agency Scoping Meeting Summary Report, which includes responses to the agency comments, is included in **Appendix J-1**. All comments received from the agencies were thoroughly considered and, when determined appropriate, modifications were made to the planning documents.

8.3.2 Public Scoping Meetings

Public scoping meetings were held on May 22, 2008; November 6, 2008; and February 6, 2009. The meetings served as a forum for providing project information to the public and receiving public input and comments. Each meeting included an open house session during which project team members interacted with the public while answering questions and listening to concerns and suggestions of potentially affected stakeholders and the general public. Letters, post cards, media advisories, email blasts and other communication tools were used to notify potentially interested stakeholders of the public scoping meetings. In addition, notice of the public scoping meetings was published in newspapers having general circulation in the project area and posted on the project web site:

http://cameroncountyrma.org/SPI2ndAccess/index.asp?p=home

In recognition of the large Spanish-speaking population and the presence of environmental justice populations in the study area, public notices were published in English and Spanish. Meeting hand-outs and other printed materials were available in both English and Spanish. Spanish-speaking project team members were present at the meetings and available to interact with/answer questions from individuals with limited English proficiency. Although technical presentations were made in English, Spanish translators were available to those requesting translation.

Public scoping meetings were also announced via the project website, media releases and placement of a changeable message board at the foot of the existing causeway.

Table 8-1 provides information on publication of the public notices for the three public scoping meetings.

Table 8-1: Public Scoping Meetings

May 22, 2008 Public Scoping Meeting		November 6, 2008 Public Scoping Meeting		February 6, 2009 Public Scoping Meeting	
Publication	**Publish Dates**	**Publication**	**Publish Dates**	**Publication**	**Publish Dates**
The Brownsville Herald	April 1, 2008, April 22, 2008, May 5, 2008 (English notice)	*The Brownsville Herald*	October 5, 2008, October 26, 2008 (English notice)	*The Brownsville Herald*	January 25, 2009, February 15, 2009 (English notice)
El Extra	April 5, 2008, April 25, 2008 (Spanish Notice)	*The Valley Morning Star*	October 7, 2008 October 27, 2008	*The Valley Morning Star*	January 25, 2009, February 17, 2009
El Nuevo	April 4, 2008, April 22, 2008 (Spanish Notice)	*El Nuevo*	October 5, 2008, October 26, 2008 (Spanish notice)	*El Nuevo*	January 29, 2009, February 15, 2009 (Spanish notice)
The Island Breeze	April 6, 2008, April 27, 2008 (English Notice)	*The Island Breeze*	October 5, 2008, October 26, 2008 (English notice)	*The Island Breeze*	January 30, 2009, February 15, 2009 (English notice)
The Port Isabel/South Padre Island Press	April 7, 2008, April 21, 2008, May 12, 2008 (English Notice)	*The Port Isabel/South Padre Island Press*	October 5, 2008, October 27, 2008 (English Notice)	*The Port Isabel/South Padre Island Press*	January 29, 2009, February 16, 2009 (English Notice)

Community participation is an important aspect of any major project. TxDOT and CCRMA have ensured that opportunities for community input in the project development process have been and will continue to be provided. Any future public involvement efforts, including the public hearing, will continue to utilize the same or similar publications and tools to notify environmental justice and limited English proficiency populations in the study area.

8.3.2.1 Public Scoping Meeting #1

The first public scoping meeting was held on May 22, 2008, at the South Padre Island Municipal Complex, 4601 Padre Boulevard, South Padre Island, Texas. The purpose of the meeting was to:

- receive input and comments from the public regarding the need and purpose of the proposed project and the proposed study area;
- present the draft Project Coordination Plan and receive input;
- answer questions concerning the proposed project;
- allow interested citizens the opportunity to comment on the proposed project; and
- develop a record of public views and participation.

A total of 204 people registered their attendance at the public scoping meeting. Of these, two were elected officials and 187 were property owners, residents, and business owners. The remaining attendees were officials/employees from the CCRMA and TxDOT, and staff members from the project consultant HNTB Corporation.

The court reporter recorded comments from 24 individuals. Thirty-nine comment forms were received, and 42 letters, emails or other written comments were submitted. Of the 105 comments received (this includes the 24 verbal comments made at the meeting), eight were from elected officials. Several individuals submitted comments via more than one method; thus, the number of individuals submitting comments was less than 105. These comments have been summarized in the Public Meeting Summary report found in **Appendix J-2**.

Although only two elected officials attended the meeting, eight submitted comments. Of these eight, five expressed support for the proposed project. Three expressed neither support nor opposition, but instead provided specific comments pertaining to one or more aspects of the proposed project.

Subsequent to Public Scoping Meeting #1, a Public Meeting Summary Report was prepared. The report includes a description of the meeting and copies of meeting hand-outs, public notices and registration sheets. In addition, the report includes copies of comments received in response to the meeting and responses to each of the comments. A summary of the meeting is included in **Appendix J-2**. A complete copy of the Public Meeting Summary Report, which is incorporated herein by reference, is on file and available for review at the TxDOT Pharr District office.

8.3.2.2 Public Scoping Meeting #2

The second public scoping meeting was held on November 6, 2008, at the Port Isabel High School Auditorium, 18001 State Highway (SH) 100, South Padre Island, Texas. The purpose of the meeting was to:

- update the public about the project and project development activities;
- present the Project Coordination Plan;
- receive comments and input from the public regarding the preliminary alternatives;
- receive comments and input from the public regarding the draft evaluation criteria that would be used to evaluate the preliminary alternatives; and
- develop a record of public views and participation.

A total of 153 people registered their attendance at the public scoping meeting. Of these, 14 were elected officials or representatives of elected officials, and 121 were property owners, residents, and business owners. The remaining attendees were officials/employees from CCRMA, TxDOT, the Federal Highway Administration, and staff members from the project consultant HNTB Corporation.

Eleven people presented verbal comments during the public comment session of the public scoping meeting. Five people presented verbal comments via the recording station. In addition, 25 written comments were received by the submission deadline. Of the 41 comments received, two were from elected officials and three were from non-elected public officials. One person submitted verbal comments and two sets of written comments; two others submitted both verbal and written comments; thus, comments were received from a total of 37 individuals.

Subsequent to Public Scoping Meeting #2, a Public Meeting Summary Report was prepared. The report includes a description of the meeting and copies of meeting hand-outs, public notices and registration sheets. In addition, the report includes copies of comments received in response to the meeting and responses to each of the comments. A summary of the meeting is included in **Appendix J-3**. A complete copy of the Public Meeting Summary Report, which is incorporated herein by reference, is on file and available for review at the TxDOT Pharr District office.

8.3.2.3 Public Scoping Meeting #3

The third public scoping was held on February 26, 2009, at the Port Isabel High School Auditorium, 18001 SH 100, South Padre Island, Texas. The purpose of the public scoping meeting was to:

- update the public about the project and on-going project development activities;
- present the recommended reasonable alternatives;
- receive comments and input from the public regarding the recommended reasonable alternatives; and
- develop a record of public views and participation.

A total of 171 people registered their attendance at the public scoping meeting. Of these, nine were elected officials or representing elected officials, and 156 were property owners, residents and business owners. The remaining attendees included officials/employees from the Cameron County Regional Mobility Authority, the Texas Department of Transportation, Federal Highway Administration and staff members from the project consultant HNTB Corporation.

The court reporters received comments from 10 individuals, one submitted privately and nine submitted during the public comment session of the Public Scoping Meeting. Twenty-four written comments were received via letter, email and the comment form provided at the Public Scoping Meeting. Of the 34 total comments received, four were from elected officials. Several individuals submitted joint comments and several individuals submitted comments via more than one method.

Of the four elected officials' comments, three expressed support for the proposed project. One expressed neither support nor opposition, but instead provided specific comments pertaining to one or more aspects of the proposed project.

Subsequent to Public Scoping Meeting #3, a Public Meeting Summary Report was prepared. The report includes a description of the meeting and copies of meeting hand-outs, public notices and registration sheets. In addition, the report includes copies of comments received in response to the meeting and responses to each of the comments. A summary of the meeting is included in **Appendix J-4**. A complete copy of the Public Meeting Summary Report, which is incorporated herein by reference, is on file and available for review at the TxDOT Pharr District office.

8.4 CONTEXT SENSITIVE SOLUTIONS COMMUNITY WORKSHOPS

To further facilitate and encourage public engagement in the project development process, a series of context sensitive solution workshops was conducted. A table was set up at each public scoping meeting to collect contact information for citizens desiring to participate in the workshops. These citizens where then sent an invitation for the meeting closest to their community. Additionally, context sensitive solution workshop information was announced at CCRMA Board meetings. All workshops were open to the public; an invitation was not necessary in order to participate.

These workshops began a dialog on what the citizens of the area wanted for the access project culturally, practically, and artistically, and engaged stakeholders in identifying community values and needs related to 2nd Access Project planning. The workshops, which augmented the public

scoping process, served as forum for vetting community and resource agency issues and concerns in a collaborative, interactive and constructive manner.

From October 2008 to September 2009, a total of nine context sensitive solution workshops were conducted. The workshops were held in the communities of Port Isabel, Laguna Vista and South Padre Island. Three workshops were held in each community. Details of each workshop are provided in **Table 8-2**. A report documenting the context sensitive solution process in found in **Appendix J-4**.

Table 8-2: Context Sensitive Solutions Community Workshops

Time/Date	Location	Agencies/Organizations Represented
Noon-2 p.m. October 1, 2008	Port Isabel City Hall, 3005 East Maxan Street, Port Isabel, Texas	City of Port Isabel, Port Isabel Economic Development Council, Port Isabel business owners, Port Isabel Press, HNTB
6:00-8:00 p.m. October 1, 2008	Laguna Vista City Hall, 122 Fernandez Street, Laguna Vista, Texas	TxDOT, Laguna Atascosa National Wildlife Refuge, Laguna Vista Police Department, USFWS, Town of Laguna Vista, HNTB
6:00-8:00 p.m. October 2, 2008	South Padre Island Municipal Complex's Alderman Board Room, 4601 Padre Boulevard, South Padre Island, Texas	TxDOT, South Padre Island business owners, South Padre Island Visitors Bureau, Town of South Padre, South Padre Island Board of Aldermen, South Padre Island residents, HNTB
2:00-3:30 p.m. February 17, 2009	South Padre Island Convention Center, 7355 Padre Boulevard, Padre Island, Texas	TxDOT, South Padre Island Board of Aldermen, South Padre Island Public Works Department, HNTB
6:00-7:30 p.m. February 17, 2009	Laguna Vista City Hall, 122 Fernandez Street, Laguna Vista, Texas	TPWD, USFWS, SPI Go Green, Laguna Vista residents, HNTB
Noon-1:30 p.m. February 18, 2009	Port Isabel City Hall Meeting Room, located at 305 East Maxan Street, Port Isabel, Texas	TxDOT, Port Isabel property owners, Port Isabel Press, Port Isabel residents, HNTB
Noon-1:30 p.m. August 5, 2009	Port Isabel City Hall, 304 East Maxan Street, Port Isabel, Texas	Port Isabel resident, HNTB
5:30-7:00 p.m. August 6, 2009	South Padre Island Municipal Complex, 4601 Padre Boulevard, South Padre Island, Texas	South Padre Island Board of Aldermen, South Padre Island Police Department, Property Owners Who Care-South Padre Island, TPWD, South Padre Island realtors, HNTB
5:00-6:30 P.M. September 3, 2009	Laguna Vista City Hall, 122 Fernandez Street, Laguna Vista, Texas	TxDOT, USFWS, South Padre Island residents, Island Breeze newspaper, City of Laguna Vista

8.5 TECHNICAL WORKING GROUPS

Five technical working groups were formed to aide in guiding the project development process. Each working group represented a specific area of technical expertise. Initial working group participants were identified based on their knowledge of topical areas or specific issues; however, because all meetings were open to the public, attendance and participation often extended beyond the technical specialists. In addition to inviting representatives with expertise pertaining to each technical working group, most meetings where announced at CCRMA Board meetings and open to the public. Each of the five technical working groups is discussed below.

8.5.1 Public Involvement Technical Working Group

A Public Involvement Technical Working Group was created for the proposed 2nd Access Project and four meetings were held. Invited members included individuals in the communication field representing local community organizations from Cameron County. The members of the Public Involvement Technical Working Group were instrumental in providing

local perspective. Further, because the individuals serving on the Public Involvement Technical Working Group live and work in the project area and interact with the general public on a regular and on-going basis, the group also served as one of several methods of communicating project information to and from the general public.

Table 8-3 contains details about the Public Involvement Technical Working Group meetings.

Table 8-3: Public Involvement Technical Working Group Meetings Summary

Time/Date	Location	Agencies/organizations represented
9:30-11:30 a.m. April 3, 2008	La Quinta Conference Room, 7000 Padre Blvd., South Padre Island, TX 78597	CCRMA, TxDOT, Property Owners Who Care South Padre Island, South Padre Island Chamber of Commerce, South Padre Island Economic Development Corporation, South Padre Island Convention and Visitors Bureau, HNTB
9:30-11:30 a.m. June 19, 2008	Port Isabel City Hall Board Room, 305 East Maxan Street	City of Padre Island, South Padre Island Economic Development Corporation, Harlingen Area Chamber of Commerce, South Padre Island Convention and Visitors Bureau, HNTB
4:00-5:30 p.m. February 12, 2009	Laguna Vista City Hall, 122 Fernandez Street, Laguna Vista, TX 78578	TxDOT, Laguna Vista Board of Aldermen, South Padre Island Chamber of Commerce, Town of Laguna Vista, HNTB
9:30-11:30 a.m. August 6, 2009	Howard Johnson Conference Room, 1709 Padre Boulevard, South Padre Island TX 78587	CCRMA, TxDOT, TPWD, South Padre Island Convention and Visitors Bureau, South Padre Island Economic Development Corporation, City of Brownsville, Town of South Padre Island, HNTB

The first Public Involvement Technical Working Group meeting served as a kick-off meeting. At this meeting the project team presented basic project information and an overview of the NEPA process. The role and purpose of the technical working group was discussed. Subsequent meetings (meetings 2, 3 and 4) were held after each of the public scoping meetings. These meetings served as a forum for updating working group membership on the status of the proposed project, reviewing comments received from the community during the preceding scoping meeting, and discussing next steps/group recommendations.

8.5.2 Economic Development Technical Working Group

The purpose of the Economic Development Technical Working Group is to provide guidance pertaining to economic development plans, goals and objectives of communities in and adjacent to the study area. In addition, the group assisted in the development of the scope of services for the 2nd Access Project economic study and served as a peer review forum for the analysis.

Details about meetings of the Economic Development Technical Working Group are provided in **Table 8-4**.

Table 8-4: Economic Development TWG Meetings Summary

Time/Date	Location	Agencies/organizations represented	Topics of Discussion
3:00-5:00 p.m. November 14, 2007	IBC Bank, 911 Padre Blvd., South Padre Island, Texas	CCRMA, HNTB, Prime Strategies, Inc.	• Project overview • Project status • Purpose of Economic Analysis • Planned approach to undertaking Economic Analysis
2:00-4:00 p.m. March 4, 2009	Howard Johnson Conference Room, 1709 Padre Blvd., South Padre Island, Texas	TxDOT, TXP, Inc., South Padre Island Economic Development Corp., Texas General Land Office, HNTB	• Project status/update • CCRMA System • Status of the Economic Analysis/next steps
9:30-11:00 a.m. October 30, 2009	World Birding Center 6810 Padre Boulevard, South Padre Island, Texas 78597	TxDOT, TXP, Inc., South Padre Island Economic Development Corp., Texas General Land Office, HNTB, CCRMA, South Padre Island Golf Club, Local Realtors, Jacobs Engineering	• Project status/update • Population and Employment Impact Analysis

8.5.3 Engineering Technical Working Group

The Engineering Technical Working Group collaborates and provides guidance pertaining to engineering and design issues. The Engineering Technical Working Group consists of representatives from TxDOT, CCRMA, FHWA and the project consultant team. **Table 8-5** provides details of Engineering Technical Working Group meetings.

Table 8-5: Engineering Technical Working Group Meetings Summary

Time/Date	Location	Agencies/organizations represented
1:30-3:30 p.m. February 11, 2009	HNTB Brownsville Office, 1805 Ruben Torres, BLVD. Suite A-15, Brownsville, Texas HNTB Austin Office, 301 Congress Ave. #600, Austin, Texas	CCRMA, TxDOT, FHWA, HNTB
3:30-5:00 p.m. July 16, 2009	HNTB Brownsville Office, 1805 Ruben Torres, BLVD. Suite A-15, Brownsville, Texas HNTB Austin Office, 301 Congress Ave. #600, Austin, Texas	CCRMA, TxDOT, Town of South Padre, Brownsville Metropolitan Planning Organization, HNTB

At the first Technical Working Group Meeting, alternatives were presented and alternative development/refinements were discussed with the representatives from TxDOT, CCRMA, and FHWA. Preliminary alternatives were discussed and additional modes of transportation were considered to apply to the reasonable alternatives.

At the second meeting reasonable alternatives were presented and the refinement of these alternatives was discussed. Modal options and screening was also discussed; specifically, ferry, rail and tunnel.

8.5.4 NEPA Technical Working Group

The purpose of the NEPA Technical Working Group is to provide a forum for resource agencies and other interested stakeholders to review and monitor on-going environmental studies and the development of the environmental impact statement. The NEPA Technical Working Group also provided the project team with an effective means of soliciting technical advice and guidance regarding resources under the jurisdiction of the various agencies. The technical working group also provided a forum for resource agencies, including participating and cooperating agencies,

to assist in identification of environmental impacts and the development of mitigation strategies and plans. **Table 8-6** provides details pertaining to the meetings of the NEPA Technical Working Group, including a summary of items discussed in each meeting.

Table 8-6: NEPA Technical Working Group Meetings Summary

Time/Date	Location	Agency/Organization represented	Topics of Discussion
1:00 p.m. May 22, 2008	South Padre Island Municipal Complex, South Padre Island, Texas	CCRMA, TxDOT, FHWA, TPWD, South Padre Island CP, USFWS, City of Port Isabel, Town of Laguna Vista, NOAA Fisheries, Cameron County Parks Department, Kentan Properties, South Padre Economic Development Corp., USACE, Brownsville Municipal Planning Organization, Holdar Engineering, U.S. Coast Guard, Laguna Madre Water District	• Project background. • NEPA process and requirements • Project approach/draft Project Coordination Plan • Study area • Draft need and purpose statement, • Issues of concern to the resource agencies
2:00 p.m. October 27, 2008	Howard Johnson Conference Room, South Padre Island, Texas	CCRMA, TxDOT, USFWS, City of Brownsville, South Padre Island Board of Alderman, U.S. Coast Guard, South Padre Island Economic Development Corp., Laguna Madre Water District, TPWD, Brownsville Municipal Planning Organization, Federal Highway Administration, HNTB	• Alternatives Development Process (identification of universe of alternatives; screening process/fatal flaw analysis; identification of preliminary alternatives) • Presentation/discussion of draft preliminary alternative evaluation criteria • Issues of concern to the resource agencies
10:00 a.m. February 26, 2009	South Padre Island Municipal Complex, 4601 Padre Island Blvd., Padre Island, Texas	TxDOT, FHWA, Brownsville Municipal Planning Organization, USFWS, Texas General Land Office, TPWD, South Padre Island Economic Development Corp., Friends of Laguna Atascosa/South Padre Island Birding Center, NOAA Fisheries, USACE	• Project status/update • Review of the alternatives development process • Presentation/discussion of recommended reasonable alternatives • Next steps • Issues of concern to resource agencies
10:00 a.m. July 10, 2009	Laguna Vista City Hall, 122 Fernandez Street, Laguna Vista, Texas	CCRMA, TxDOT, FHWA, USFWS, NOAA Fisheries, TPWD, Town of South Padre Island, Texas General Land Office, Brownsville Metropolitan Planning Organization	• Project status/update • Discussion of method for sea grass survey. • Discussion of conceptual mitigation plan. • Issues of concern to resource agencies
9:00 a.m. September 18, 2009	Howard Johnson Conference Room, South Padre Island, Texas	TxDOT, FHWA, Brownsville Municipal Planning Organization, USFWS, Texas General Land Office, TPWD, South Padre Island Economic Development Corp.	• Project status/update • Discussion of modal analysis • Refinements to reasonable alternatives • Review of resource-specific data collection/field survey results, to date • Seagrass survey (July 209) results • Mitigation options/concepts
1:00 p.m. October 30, 2009	Howard Johnson Conference Room, South Padre Island, Texas	TxDOT, FHWA, Brownsville Municipal Planning Organization, USFWS, U.S. Coast Guard, Texas General Land Office, TPWD, South Padre Island Economic Development Corp., NOAA Fisheries	• Project status/update • Status of the DEIS • Economic analysis • Sea grass impacts and mitigation • Issues of concern to resource agencies

8.5.5 Funding Technical Working Group

The Funding Technical Working Group, once formed, will explore potential funding strategies and work with CCRMA, TxDOT and FHWA to develop and implement an effective plan for implementation of the proposed project. In light of current and anticipated future transportation funding limitations and shortfalls, it is anticipated that the funding plan would utilize a menu of funding sources and options to augment and/or leverage available tax dollars. At this time, members of this Technical Working Group have not been determined. It is anticipated that the first meeting of the Funding Technical Working Group would occur after the draft environmental impact statement is approved and a public hearing is conducted.

8.6 PUBLIC AND RESOURCE AGENCY ISSUES

Public controversy to date has been minimal. Early in the scoping process for this environmental impact statement, a number of comments were received questioning the appropriateness of SH 100 as logical termini. SH 100 currently exists as a major four-lane highway connecting United States Highway (US) 77/83 and South Padre Island. The size, function and capacity of existing SH 100 ensures that, even if no other transportation projects were implemented, the proposed 2nd Access Project would, by terminating at SH 100, be functional and constitute a reasonable expenditure of transportation dollars. By utilizing SH 100 as logical termini, the project is also of sufficient length to address environmental matters on a broad scope. Lastly, terminating the proposed 2nd Access Project at SH 100 does not restrict the consideration of alternatives for other reasonably foreseeable transportation improvements. Therefore, SH 100 satisfies all applicable criteria and is appropriate as logical termini for the proposed project.

Coordination with resource agencies has focused on potential impacts to wetlands, seagrasses and threatened and endangered species within the project area. Resource agencies have worked closely with the project team through participation in the NEPA Technical Working Group and the agency scooping meeting held in 2008. CCRMA and TxDOT are committed to working with resource agencies to develop and implement an ecosystem-based mitigation plan for the proposed project.

8.7 DRAFT ENVIRONMENTAL IMPACT STATEMENT PUBLIC HEARING

A public hearing on the proposed South Padre Island 2nd Access Project will be held subsequent to FHWA approval of the draft environmental impact statement. A notice announcing the date, time and location of the public hearing will be published in both English and Spanish 30 days and 10 days prior to the public hearing. The public notice will be published in newspapers having general circulation in the project area. In addition, project area property owners and other interested stakeholders will be notified via letters of the public hearing and encouraged to attend. Subsequent to the public hearing, the public will have 10 days to provide comment on the proposed project and the draft environmental impact statement. These comments will be collected, discussed, and responded to in the public hearing summary report that will be drafted and posted for public viewing on the TxDOT website some time after the public hearing. Actual locations for the posting, including the project web site at http://cameroncountyrma.org/SPI2ndAccess/index.asp?p=home and hardcopy location addresses, will be determined and provided at the time of the hearing. The draft environmental impact statement will be made available at multiple locations within the study area at least 45 days prior to the public hearing.

CHAPTER 9

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CHAPTER 10

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CHAPTER 11

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CHAPTER 12

LIST OF ABBREVIATIONS

AADT	average annual daily traffic
BG	block group
CCRMA	Cameron County Regional Mobility Authority
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CT	census tract
dBA	A weighted decibel value
DHHS	U.S. Department of Health and Human Services
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FM	Farm-to-Market Road
$\mu g/m^3$	Micrograms per cubic meter
LANWR	Laguna Atascosa National Wildlife Refuge
MSATs	Mobile Source Air Toxics
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NOAA Fisheries	National Oceanic and Atmospheric Administration National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
ppb	parts per billion
ppm	parts per million
PM	Particulate Matter
ROW	right of way
RSA	resource study area
SH	State Highway
SW3P	Storm Water Pollution Prevention Plan
TCEQ	Texas Commission on Environmental Quality
THC	Texas Historical Commission

TPWD	Texas Parks and Wildlife Department
TxDOT	Texas Department of Transportation
U.S.	United States
US	U.S. Highway
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCB	U.S. Census Bureau
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service

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EXECUTIVE SUMMARY

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CHAPTER 5

CHAPTER 6

CHAPTER 7

CHAPTER 8