1.0 NEED FOR AND OBJECTIVES OF ACTION

1.1 STUDY AUTHORITY AND LOCATION

A congressional resolution was adopted 1 August 1990 by the committee on Public Works and Transportation, U.S. House of Representatives, which authorized the U.S. Army Corps of Engineers (USACE) to review the reports on the Port Aransas-Corpus Christi Ship Channel, Texas (45-foot project), published as House Document 99, 90th Congress, Second Session, and other pertinent reports to determine the feasibility of modifying the Corpus Christi Ship Channel (CCSC) system from the current depth of 45 to 50 feet to accommodate large vessels, increase shipping efficiency, and enhance navigation safety. The Port of Corpus Christi Authority (PCCA), non-Federal sponsor of the existing channel system, began consideration of additional channel improvements upon the 1989 completion of the 45-foot deepening project. The USACE completed the reconnaissance study in 1994 concluding that the benefits of channel improvements would be 2.5 times greater than the project cost. Thus began a Feasibility Study (FS), Corpus Christi Ship Channel – Channel Improvement Project (CCSCCIP), to determine whether the Federal navigation project is justified and to provide documentation needed to request Congressional authorization and funding for construction of the project. In 1999, the USACE and PCCA signed an agreement to conduct an FS, including an Environmental Impact Statement (EIS). The project is being led by the USACE, but cost is shared with PCCA, with the U.S. Environmental Protection Agency (EPA) as a cooperating agency.

The study area for the CCSCCIP encompasses Corpus Christi Bay, including the southern section of Redfish Bay and the northernmost section of the Laguna Madre, Nueces Bay, the lower Nueces River (12 miles), Inner Harbor, Viola Channel, La Quinta Channel, and the watershed surrounding these water bodies up to roughly ½ mile inland from all shorelines (Figure 1-1). The coastline of this area extends across Nueces and San Patricio counties and is adjacent to the cities of Corpus Christi, Portland, Ingleside-On-The-Bay, and Port Aransas.

The CCSC is located in Corpus Christi Bay on the south-central portion of the Texas coast, 200 miles southwest of Galveston and 150 miles north of the mouth of the Rio Grande River. This channel ranks seventh in the nation for tonnage shipped on oceangoing vessels, and, in Texas, only the Houston Ship Channel handles more tonnage.

1.2 PURPOSE AND NEED

The purpose of the project includes improvement in the efficiency and safety of the deep-draft navigation system, and protection of the quality of the area's coastal and estuarine resources. Safety improvements would address problems identified below and contribute to economic efficiency. Economic efficiency would result from the passage of large ships through the CCSC that previously had to remain offshore and transfer cargo into smaller crude tankers for the remainder of the voyage. Vessel delays and the potential for accidents would also be reduced. Protection of the area's coastal and estuarine resources would be associated with reduced potential for accidents and oil spills.

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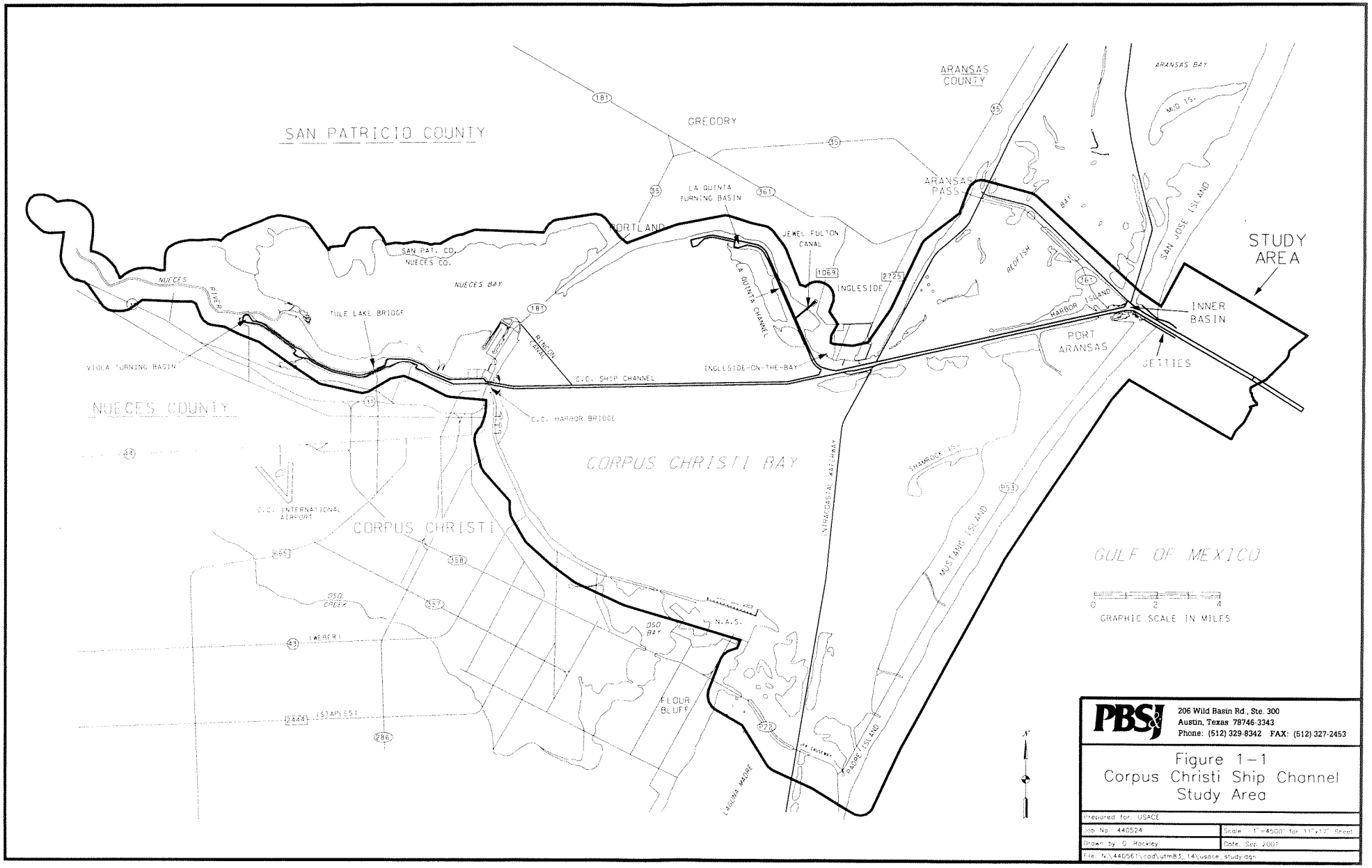

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Figure 1-1
Corpus Christi Ship Channel
Study Area

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Job No.: 440524	Scale: 1"=4500' for 11"x17" Sheet
Drawn by: G. Rackley	Date: Sep. 2001
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The channel reach between the Corpus Christi Harbor Bridge and the La Quinta Channel is only 400 feet wide and, since it is in an open-bay area, is subject to strong crosswinds and currents. At present, ships wait offshore and time their entrance into the CCSC to pass in the 500-foot reach since they cannot pass in the 400-foot reach, rather than incur the expense to obtain tug assistance to moor and wait with a pilot on board as well as tugs standing by to release them from the moorings. Widening the 400-foot reach is needed to increase the safety factor for this area and to reduce shipping delays, especially since shipping trends indicate a movement toward use of larger vessels.

Presently, few crude oil vessels are loaded to more than 41 feet because general policy requires vessels to have 3 feet of underkeel clearance. Therefore, the current channel depth requires that large crude carriers remain offshore and transfer their cargo into smaller crude tankers for the remainder of its voyage. Lightering also increases the potential of a collision, oil spill, or fire, leading to adverse environmental consequences. Channel deepening is needed to avoid both inefficiency and risk of adverse impacts from lightering.

Channel widening and deepening are also needed since several of the major petrochemical industries are currently undergoing major expansions, which will result in an increase in crude oil imports. As these imports increase, the number of lightering vessels and product carriers will also increase, adding to shipping delays and congestion. Since the most frequent shipping accidents result from collisions between ships and inland tows, the towing industry and channel industries are concerned that restrictions may be placed on the tows to limit these costly and environmentally damaging events. The proposed project would reduce delays, and the inclusion of barge shelves will reduce the risk of ship-tow collisions.

1.3 EXISTING PROJECT

The CCSC, formerly known as the Port Aransas – Corpus Christi Waterway, is a consolidation of past improvements of Port Aransas and the channel from Aransas Pass to Corpus Christi. The CCSC project channel system also includes La Quinta Channel, Jewel Fulton Canal, and Rincon Canal. The history of Federal Involvement in navigation improvements in the Corpus Christi Bay area began with the Rivers and Harbors Act of June 18, 1878. In August 1968, authorization of major improvements to the CCSC included increasing existing channels and basins to a 45-foot depth, a deep-draft turning area, a deep-draft mooring area and mooring facilities, and widening of the channels and basins at certain locations. The undredged northward extension of the Inner Basin at Harbor Island and the undredged west turnout between the La Quinta Channel and the main channel of the waterway was deauthorized. The 45-foot project was completed in 1989.

The existing authorized Federal navigation project consists of channels and turning basins suitable for oceangoing vessels and rubble-stone jetties. The channel begins at deep water in the Gulf of Mexico about 4.3 miles offshore, passes through the jettied inlet, and extends about 21 miles westward to Corpus Christi. Continuing west, the channel extends about 8.5 miles through the harbor area before terminating at the Viola Turning Basin. The north and south jetties are 11,190 and 8,610 feet long and extend into the Gulf from San Jose (formerly St. Joseph's) and Mustang islands, respectively, and stabilize the natural inlet of Aransas Pass. The stone dike on San Jose Island connects with the north

jetty and extends 20,991 feet up the island. The La Quinta Channel extends off of the CCSC near Ingleside, Texas, and runs parallel to the eastern shoreline of Corpus Christi Bay for 5.5 miles to the La Quinta Turning Basin.

1.4 PROBLEMS, NEEDS, AND PUBLIC CONCERNS

Existing water resource problems and needs in Corpus Christi Bay were identified through coordination with Federal and State agencies, area residents, waterway users, and the USACE and PCCA. Most of the identified problems are not unique to Corpus Christi Bay but are common to many of the bays and estuaries in Texas. It should be noted that the following include all of the problems and concerns raised at a series of public meetings. Some have no relevance to this project and are general concerns raised by the citizens of the area. Many are concerns that cannot or will not be addressed in a project-specific EIS. However, all of the concerns raised by agencies and persons at those meetings are discussed in this section. As a consequence of the way the questions, comments, and concerns were collected, some are vague. However, they were reproduced as nearly as possible in this document, without embellishment. Concerns pertinent to the proposed project are addressed in this FEIS.

1.4.1 Navigation/Commerce

The CCSC was the first waterway in Texas to be completed to a 45-foot depth. Since the completion of the 45-foot project, the size of ships using the waterway has steadily increased, and vessels currently have to be light-loaded to traverse the waterway.

The channel reach between the Corpus Christi Harbor Bridge and Ingleside is only 400 feet wide and is subject to strong crosswinds and currents, while the reach between Ingleside and the jetties is 500 feet wide and is semi-protected by emergent Dredged Material Placement Areas (PAs) (Figure 1-2). As part of the 45-foot project, a mooring area was constructed near Ingleside. This facility consists of six mooring dolphins and ten mooring anchors. It was designed to hold inbound ships at Ingleside while other large ships were crossing the open water area from the Harbor Bridge to Ingleside. This facility has not functioned as designed, is in poor repair, and will soon be removed. Shippers prefer to wait offshore and time their entrance to pass in the 500-foot reach rather than incur the expense to obtain tug assistance to moor and wait with a pilot on board and tugs standing by to release them from the moorings. Widening the upper bay reach would increase the safety factor for this area and would reduce shipping delays, especially since shipping trends indicate a movement toward use of larger vessels. The ultimate size of vessels using the channel is restricted by the 138-foot vertical clearance of both the Harbor Bridge and the Tule Lake Lift Bridge. However, the clearance is sufficient to accommodate the present fleet of vessels using the project.

The 45-foot channel deepening project became operational in the late eighties and, at that time, crude oil tankers with loaded drafts up to 45 feet mean low tide (MLT) were not uncommon. MLT is 1 foot lower than National Geodetic Vertical Datum 29 (NGVD 29) (i.e., 0 feet MLT is equivalent to –1 NGVD 29) as used by the Galveston District of the USACE. Presently, few crude oil vessels are loaded to more than 41 feet. Examination of vessel records shows that some petroleum coke vessels are

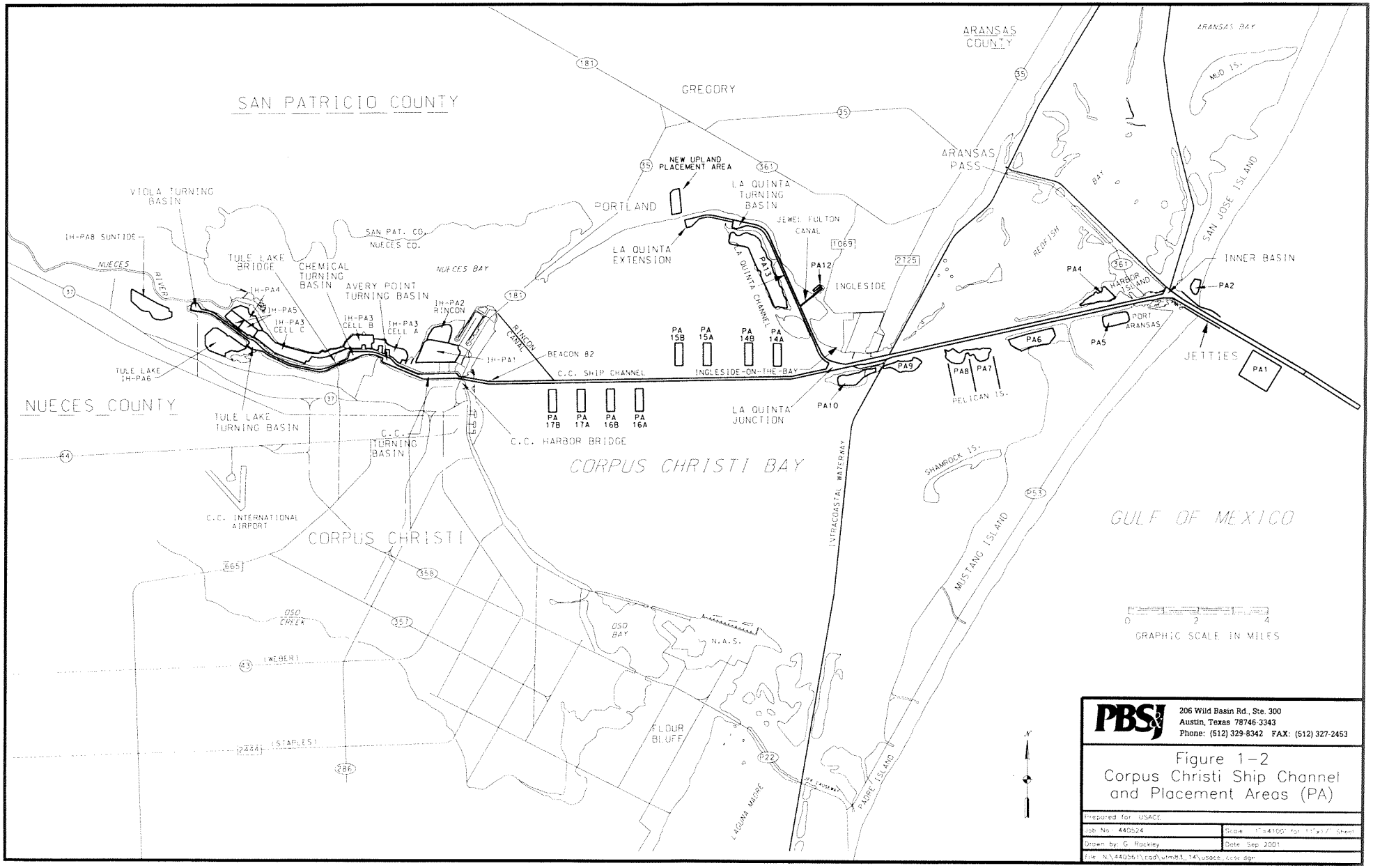

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Figure 1-2
Corpus Christi Ship Channel and Placement Areas (PA)

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Job No.: 440624	Scale: 1"=4100' for 11"x17" Sheet
Drawn by: G. Rackley	Date: Sep. 2001
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presently loaded to depths of up to 45 feet MLT. Some pilots have allowed dry cargo, such as petroleum coke, to be loaded to deeper depths than liquid cargo. The general policy requires vessels to have 3 feet of underkeel clearance. Examination of 1996-1999 transit records shows that loaded drafts over 41 feet are infrequent, particularly for liquid cargo. In comparison, 1990 traffic data compiled for the 1994 reconnaissance report reveals that 1 foot of underkeel or less was not uncommon for liquid cargoes during the early 1990s.

The current channel depth requires that large crude carriers remain offshore and transfer their cargo into smaller crude tankers for the remainder of its voyage. This lightering operation takes place in the Gulf where the two ships, the mother ship and the lightering ship, come together to transfer the cargo. Although this operation has been occurring for years, the possibility for a collision, oil spill, fire, or other adverse environmental consequence is always present.

Several of the major petrochemical industries are currently undergoing major expansions which will result in an increase in crude oil imports. As these imports increase, the number of lightering vessels and product carriers will also increase, adding to shipping delays and congestion. Since the most frequent shipping accidents result from collisions between ships and inland tows, the towing industry and channel industries are concerned that without the proposed project, restrictions may be placed on the tows to reduce the potential for these costly and environmentally damaging events occurring.

Other issues of concern associated with navigation include those related to erosion and siltation. Shoreline erosion is occurring along the ship channel in the Port Aransas area. Ship wakes may be contributing to this problem, and an evaluation of the erosion problem was requested for inclusion in this study. The channel area in Corpus Christi Bay near the Harbor Bridge has a high siltation rate.

The remaining capacity of existing upland placement sites as well as the continued suitability of bay placement areas was suggested as requiring further study. It was suggested that a bay-wide plan which encourages the use of dredged materials for beneficial uses (BU) should be developed in the future.

1.4.2 Environmental

Many of the problems, such as pollution, are caused by human activities around the bay system and in the contributing watershed, while others, such as shoreline erosion, are a result of both human activities and natural processes, including normal wind-generated waves and hurricanes. The environmental concerns identified during meetings with the public and resource agencies in the reconnaissance study included the following items:

The increasing potential for environmental harm resulting from shipping accidents is a major concern. In the absence of adequate channel widening, one-way traffic will increase as a means to reduce this threat. One-way traffic has already been imposed when combined beam widths of meeting vessels would exceed 251 feet in the existing 400-foot-wide channel.

Oil spill recovery and definition of the liabilities associated with the clean-up are important to both the environmental community and the oil shipping industry. This understanding is necessary to

ensure that cleanup activities are started immediately and are completed as quickly as possible to minimize damages.

Sediment quality in the Inner Harbor has been questioned by members of the RACT and environmental groups. See sections 3.2.3.5, 3.3.1, 3.3.2.5, 4.1.3, and 4.2 for an explanation of how these sediments will be handled.

The ship channel and open-bay placement areas could impact circulation and salinity levels within the bay. In addition, open-bay placement may present problems for the benthic community, circulation, and recreational and commercial fisheries, and may produce a need for future maintenance dredging.

During public scoping meetings and resource agency workshops, several areas of concern were raised that could possibly receive some type of action as a result of channel modifications or mitigation of the unavoidable impacts. It was suggested that water interchange between Corpus Christi Bay and the Laguna Madre could be improved, specifically in the vicinity of the John F. Kennedy (JFK) Causeway and the Gulf Intracoastal Waterway (GIWW). Impacts to wetlands, submerged aquatic vegetation (SAV), and shallow water were a concern as well. Suggested beneficial actions include construction of oyster reefs in and around the Corpus Christi area, enhancement of Redfish Bay, creation of wetlands, SAV, and unvegetated shallow water, and development of bird rookery islands in Nueces Bay.

1.5 PLANNING OBJECTIVES

The planning objectives of the Federal navigation project include improvement in the efficiency and safety of the deep-draft navigation system, and maintenance or enhancement of the quality of the area's coastal and estuarine resources. Safety improvements would address problems identified and contribute to economic efficiency. Economic efficiency would result from the passage of large ships through the CCSC that previously had to remain offshore and transfer cargo into smaller crude tankers for the remainder of the voyage. Economic benefits could also be realized from the proposed container terminal adjacent to the La Quinta Channel extension. Vessel delays and the potential for accidents would also be reduced.

Maintenance and enhancement of the area's coastal and estuarine resources would be associated with reduced potential for accidents and oil spills; beneficial uses of dredged material; minimization of effects to oyster beds, seagrasses, and other valuable habitats; and avoidance of areas with known cultural resource sites.

1.6 NON-FEDERAL SPONSOR AND COORDINATION

The Galveston District, USACE, is responsible for the general management of this FEIS. The PCCA is the non-Federal sponsor and has been an active participant during the reconnaissance phase and FS. As non-Federal sponsor for the waterway, the PCCA has the overall responsibility of acquiring PAs. Generally, the feasibility phase is cost-shared equally between the non-Federal sponsor

and the Federal government through the General Treasury. Management has been coordinated between the USACE and the non-Federal sponsor.

EPA is a cooperating agency (40 CFR Part 1501.6) in the EIS process pursuant to its specific programs and responsibilities, including: 1) Section 309 of the Clean Air Act in review of the EIS in compliance with NEPA; 2) the Marine Protection, Research, and Sanctuaries Act in the designation of feasible and environmentally acceptable ocean dredged material disposal sites; and 3) Section 404 of the Clean Water Act in consideration and evaluation of impacts on wetlands and waters of the United States in coordination with the USACE and FWS.

The FS involves multidisciplinary studies to determine the specific improvements needed and the benefit-cost ratios of various alternatives. The Regulatory Agency Coordination Team (RACT), established by the PCCA and the USACE, provides guidance and wise counsel on matters relating to the evaluation of environmental impacts of this project. Members include PCCA, USACE, National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (FWS), Texas Parks and Wildlife (TPWD), U.S. Environmental Protection Agency (USEPA), Texas Natural Resource Conservation Commission (TNRCC), Railroad Commission (RRC), Texas Water Development Board (TWDB), Texas Department of Transportation (TxDOT), and Texas General Land Office (GLO).

Several technical work groups composed of members of the RACT have been established to focus on specific environmentally related areas of the project, with some overlap between workgroups. These groups have helped define the scopes of work for certain studies as well as review study results (Table 1.6-1). Workgroups include Shoreline Erosion Workgroup (SEW), Cumulative Assessment Workgroup (CAW), Hydrodynamic and Salinity Modeling Workgroup (HSMW), Contaminants Workgroup (CW), Mitigation Workgroup (MW), and Beneficial Uses Workgroup (BUW).

The SEW was created to evaluate the relationship and relative contribution of the project on shoreline erosion in the project area and provide information to guide shore stabilization, erosion protection, project impact assessment or mitigation, and beneficial use alternatives analysis.

The CAW was created to collect information from past changes in bay water salinity patterns, bay bottom losses and disturbances, wetland losses, and water and sediment quality changes, and future projections of the cumulative impact based on reasonably foreseeable development within the project area.

The HSMW was created to identify the model scenarios, which should be addressed to evaluate environmental and biological effects potentially associated with the project.

The CW evaluated water and sediment quality associated with the proposed project, including characterization of existing conditions in the project area and the results of any physical, chemical, and biological analysis.

The MW was created to identify methods to assess direct effects of the proposed project and evaluate environmentally compatible design measures to mitigate adverse effects on fish and wildlife resources.

TABLE 1.6-1

CORPUS CHRISTI SHIP CHANNEL – CHANNEL IMPROVEMENTS PROJECT
WORKGROUP PARTICIPANTS
1998 – MAY 14, 2002

U.S. Army Corps of Engineers

Frank Garcia
Bob Bass
Bob Heinly
Terry Roberts
Carolyn Murphy
Rob Hauch
Gary Ray, WES
Doug Clark, WES
Carl Anderson
Wade Williams
Carlos Tate
Jon Plymale
John McManus
Dale Williams
Rick Medina
Rao Vemulakonda, WES
Ed Reindl
Mike Kieslich
George Alcala

U.S. Environmental Protection Agency

Mike Jansky
Monica Young
Tim Landers

U.S. Fish and Wildlife Service

Johnny French
Clare Lee
Tom Schultz
Tom Shearer
Pat Clements
Mary Orms

National Marine Fisheries Service

Bill Jackson
Rusty Swafford

Texas Department of Transportation

Raul Cantu
Amy Link
Melissa Gabriel
Paul Douglas
Scott Sullivan

Texas General Land Office

Ray Newby
Tom Calnan
Kim Halbrook
Heidi Wadzinski

Texas Natural Resource Conservation Commisson

Bruce Moulton
Mark Fisher
Rene Mariscal
Chris Caudle
Robert Burgess

Texas Parks and Wildlife Department

Smiley Nava
Jim Tolan
Mary Ellen Vega
Beau Hardegree
Kay Jenkins

Texas Railroad Commission

Mary McDaniel
Don Gault
Bill Meyer

Texas Water Development Board

Gary Powell
Junji Matsumoto
Barney Austin
Mark Wetzel

Port of Corpus Christi Authority

Greg Brubeck
David Krams
Paul Carangelo
Stacey Bryant
Sandy Escobar

Coastal Bend Bays and Estuary Program

Leo Trevino

PBS&J

Martin Arhelger
Gary Galbraith
Kari Jecker
Kathy Calnan

Pacific International Engineering

Vladimir Shepsis
Hugo Bermudez

Olivarri and Associates

Leah Olivarri
Kelly Billington

The BUW was created to identify potential beneficial uses of dredged materials and to develop a Dredged Materials Management Plan for the use of these materials. A goal of the BUW was to develop a plan that would provide a net environmental benefit (gain) for the ecosystem. One type of in-bay beneficial use site would be developed by using the dredged material to establish a "platform" of varying elevation, which would provide a mosaic of habitat conducive for colonization by seagrass and emergent vegetation. Most BU sites are multiple-use sites and are located to provide, for example, erosion protection for an area and human recreation opportunities. The offshore sites will provide topographic relief to attract marine organisms to the site. The BU sites represent the beneficial use of new work material lending itself to a purpose of a net benefit to the ecosystem. Monitoring of the sites will not occur; however, the BUW would remain organized throughout the life of the project to participate in the design of the BU sites, monitor the sites during and after construction, and provide recommendations to the project sponsors to repair or renourish the sites, as needed, during future maintenance dredging operations so that the sites function as viable habitat for the ecosystem. The maintenance material varies from silt to sand and its use will be determined by each site's purpose as determined by the BUW.

The RACT and workgroups evaluated alternatives and various studies including engineering design, ship simulations, barge shelf studies, hydrodynamic and salinity modeling, ballast water studies, and benefit and cost analysis, as well as many others.

1.7 RESOURCE MANAGEMENT ACTIONS

Resource management actions are primarily, but not limited to, beneficial uses (BUs) of dredged material, as outlined below.

The BUW and RACT developed a dredged material management/beneficial use plan (DMM/BU Plan) that utilizes dredged material in an environmentally sound and economically acceptable manner and that incorporates, to the extent possible, other public benefits into its design. The estimated amount of dredged material generated would be approximately 41 million cubic yards (mcy) of new work material, and approximately 208 mcy of maintenance material over the next 50 years, from the Entrance Channel, Lower Bay, La Quinta Channel and extension, Upper Bay, and Inner Harbor.

While developing the DMM/BU Plan, the PCCA and the BUW have solicited information from the public to identify the BUs. Categories considered included shoreline protection; erosion protection; habitat development, including creation of marshes, bird islands, underwater berms, shallow water unvegetated and vegetated areas, seagrass areas, reef structures and ecological stimulation; beach nourishment; waterfront development; construction materials; seagrass protection; recreation use; maximization of benefits from freshwater inflows; and increasing the capacity of existing PAs. Seventy-seven sites were originally derived from several public meetings and then, in December 2000, consolidated into nine categories that contained similar suggestions (PCCA, 2001a). These ideas were fully considered further by the BUW during development of the DMM/BU Plan, including the beneficial use sites described below. Within the DMM/BU Plan, eleven sites have been proposed for new habitat development and/or protection areas as described below (Figure 1-3). New work material (16.7 mcy) will be utilized to create two offshore sites, one upland site, and five open-water sites (Table 1.7-1). There are no plans to use dredged material from maintenance dredging at this time in the BU sites although, as at

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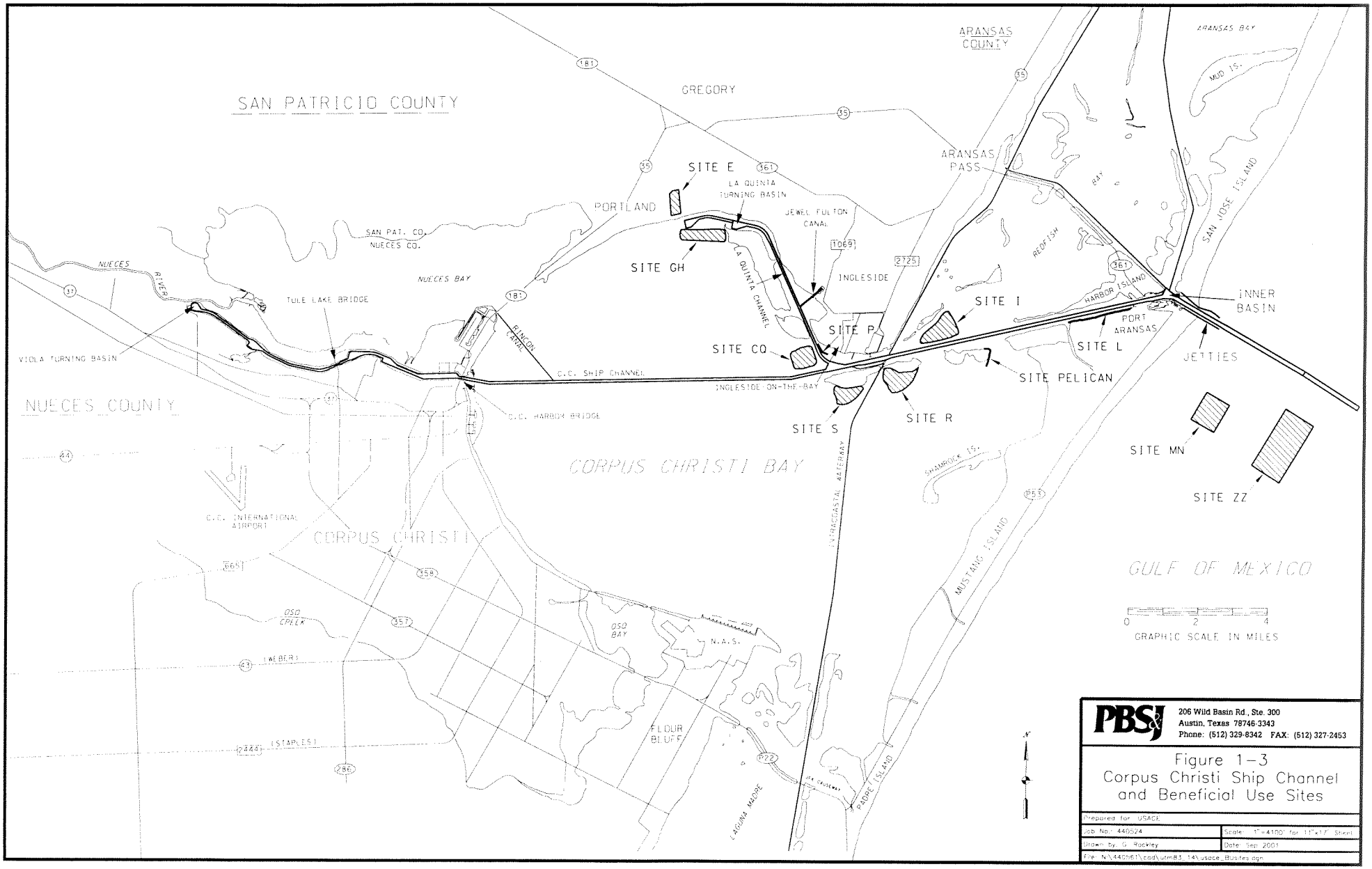

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Figure 1-3
Corpus Christi Ship Channel and Beneficial Use Sites

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Drawn by: G. Rockey	Date: Sep. 2001
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TABLE 1.7-1
BENEFICIAL USE SITES

Site	New Work Dredge Material Used at Site		Description of Creation or Protection	
	Type	Amount	Approximate Amount	Type
GH	Dense sand and hard clay	2.5 mcy	Creates 200 acres	Shallow water habitat
			Creates 15 acres	SAV
			Creates 7,500 LF	Rock breakwater
			Creates 6 acres	Marsh
CQ	Dense sand	2.9 mcy	Creates 250 acres	Shallow water habitat
			Creates 8,000 LF	Rock breakwater
			Creates 5 acres	Marsh
P	None; imported rock	n/a	Creates 2,400 LF	Rock breakwater
			Protects 45 acres	SAV
I	Dense to very dense sand	2.1 mcy	Creates 163 acres	Shallow water habitat
			Creates 7,000 LF	Rock breakwater
			Creates 15 acres	Marsh
R	Dense to very dense sand	2.4 mcy	Creates 201 acres	Shallow water habitat
S	Dense to very dense sand	1.5 mcy	Creates 121 acres	Shallow water habitat
Pelican	None; existing bird island	n/a	Protects Existing	Rookery habitat
			Creates 1,500 LF	Rock breakwater
L	None; imported rock	n/a	Creates 7,500 LF	Rock revetment
			Protects 400+ acres	Wetlands
E	Hard clay and dense sand	1.0 mcy	Creates 120 acres	Future buffer zone
ZZ	Soft silty and soft sandy clays	2.6 mcy	Creates 1,150 acres	Offshore topographic relief
MN	Soft clays with primarly dense sands	1.7 mcy	Creates 440 acres	Offshore topographic relief
	TOTALS	16.7 mcy of new work dredged material	Creates 935 acres	Shallow water habitat
			Creates 15 acres	SAV
			Creates 26,400 LF	Rock breakwater
			Creates 26 acres	Marsh
			Creates 1,590 acres	Offshore topographic relief
			Creates 120 acres	Future buffer zone
			Creates 7,500 LF	Rock revetment
			Protects 45 acres	SAV
			Protects existing	Bird Island
			Protects 400+ acres	Wetlands

* Maintenance dredged material may also be used to augment BU Sites CQ, R, S, and I, if determined to be needed in the future and maintenance material available at the correct grain size.

present, some maintenance material may be used beneficially, but only after coordination with BUW members.

Proposed BU Site GH is a rectangular site located in open water adjacent to the south side of the La Quinta Channel extension and west of PA 13 at the terminus of the existing La Quinta Channel. After construction, the site will be protected from wave erosion on two sides and contain approximately 200 acres of shallow water high and low marsh aquatic and estuarine habitat. The shallow water would have an approximate mudline from –1 to –2 feet MLT developed from the existing depth of –6 to –12 feet MLT. Approximately 15 acres of submerged aquatic vegetation (SAV) will be planted within this site as mitigation for project impact. BU Site GH will be bordered on the south and west by hydraulically filled embankments protected by geotubes and riprap to elevation +6 feet MLT to protect the shoreline and enhance vegetation colonization. A single row of *Spartina* would be planted along the inside (north side) of the wave-protection levee creating approximately 6 acres of marsh. The area would be ±7,200 to 9,000 feet long running east to west and 1,500 feet wide from north to south. The northern edge of the area would be located approximately 1,500 feet from the existing shoreline. The project provides for deposition of 2.5 mcy of new work dredged material to create the shallow water habitat.

BU Site CQ is located north of the ship channel and west of the La Quinta Channel. Site CQ will be a rectangular open water site, partially enclosing approximately 250 acres of newly created shallow water and emergent island habitat with 6 to 10 mounds of material placed in a northwest to southeast direction to decrease wind fetch inside the site. The new work material would be allowed to flow freely in the deeper eastern half of the site to fill to depths shallow enough to support seagrass. There may be some deeper holes that would not support seagrass, but these areas would provide a mosaic of habitats for marine life. The mounds would be about +3 to +5 feet MLT, and the perimeter of the emergent mounds would be fringed with *Spartina* spaced at 5-foot intervals to hasten vegetation growth and erosion protection, creating 5 acres of marsh. An armored levee for wave protection and to help contain dredged material would be created around the site on the west, south, and east boundaries with geotubes or rock breakwaters to elevation +6 feet MLT, placed over hydraulically filled base. The existing bottom is –3 to –10 feet MLT and would be raised to –1 to –2 feet MLT. This site would be approximately 4,600 feet across. The project provides for the deposition of approximately 2.9 mcy of new work dredged material to create the habitat.

BU Site P is approximately 2,400 feet long and located along the east bank of the La Quinta Channel and Ingleside-On-The-Bay. This site will function as a breakwater to minimize bank erosion and provide protection to about 45 acres of existing seagrass beds. The wave barrier would consist of a rock breakwater to elevation +6 feet MLT. The existing seagrass habitat to be protected at this site is 0 to–3 feet MLT. Dredged material will not be placed at this site.

BU Site I is located adjacent to and north of the ship channel between Dagger Island and Pelican Island, and west of the GIWW. One of the goals of BU Site I formulated by the BUW is to partially protect Dagger Island from ongoing shoreline erosion. Site I is a proposed triangular-shaped open water site, partially enclosing approximately 163 acres of shallow water habitat, including a 10- to 15-acre island in the southeast corner of the site filled to an elevation of +8 to +10 feet MLT and about 20 mounds scattered across Site I filled to an elevation of about +3 feet MLT. The site will be bordered on the south

and east sides by a hydraulically filled embankment protected on the exterior slopes by riprap and geotubes to +6 feet. The west and north sides will remain open to provide circulation between the site and the surrounding bay. A mixture of open water, shallow water, and suitable habitat for emergent and high marsh would be created at this site. A fringe of *Spartina* would be planted around the edge of the mounds and the larger island (a single row with 5-foot centers) creating approximately 15 acres of marsh. The existing bottom is at an elevation of –6 to –9 feet MLT. The project provides for the deposition of approximately 2.1 mcy of new work dredged material.

BU Site R is a proposed triangular-shaped open water site, partially enclosing approximately 201 acres of newly created shallow-water habitat. The shallow water would have an approximate mudline from –1 to –2 feet MLT developed from the existing depth of –6 to –10 feet MLT. It is located adjacent to and south of the ship channel, south of PA 9, and east of the GIWW. It will be bordered on the south and west sides by a hydraulically filled embankment, protected by riprap and geotubes on the exterior slopes to an elevation of +5 feet MLT. The project provides for the deposition of approximately 2.4 mcy of new work dredged material to create the shallow water habitat.

BU Site S is a proposed triangular-shaped open water site, partially enclosing approximately 121 acres of newly created shallow-water estuarine habitat. The shallow water would have an approximate mudline from –1 to –2 feet MLT developed from the existing depth of –6 to –10 feet MLT. It is located south of the ship channel, south of PA 10, and west of the GIWW. It will be bordered on the east side by a hydraulically filled embankment, protected by riprap and geotubes to an elevation of +5 feet MLT. The project provides for the deposition of approximately 1.5 mcy of new work dredged material to create the shallow water habitat.

A short stretch of channel(s) may have to be dredged in some of the shallower areas to allow a barge to bring rock and equipment into the area to armor the levee around Sites R and S. The dredged material from the channel(s) would be sidecast along the channel. No plantings are proposed for Sites R and S.

BU Site Pelican is a proposed open water site, located adjacent to and south of the channel, on the east side and south of Pelican Island (PAs 7 and 8). New work material will not be used at this site per se, but approximately 0.3 mcy of suitable quality new work material will be used to fill the geotubes. In the past, maintenance dredged materials have been placed on the south side of the island and allowed to flow out into the open water as a part of the ongoing rookery island enhancement, and this practice will continue. Rock revetment (1,500 feet) on the northeast corner of the island that was constructed previously to protect that part of the island from erosion will be replaced. The armoring has been lost over the years to erosion flanking the rock. Approximately 2,200 linear feet of hydraulically filled embankment, protected by geotube and riprap, will extend bayward from the east end of the island. The purpose of this hydraulically filled embankment is to contain the dredged maintenance material flowing off the south side of the island to maintain an open-water channel between Pelican and Mustang Islands, thereby preventing land bridge access to Pelican Island from Mustang Island by predators. This embankment will also protect the island from shoreline erosion.

BU Site L is located on the south bank of the channel between Piper Channel and the public Fishing Pier just west of Port Aransas. The rock revetment at this site is intended for a marsh/ecosystem protection site and will not use dredged material. The rock revetment will follow the shoreline with 3,400-foot, 500-foot, and 3,600-foot sections from west to east, respectively. A gap will be left between each section to allow for storm tide exchange. The existing ground elevation is +5 feet.

BU Site E is located on PCCA-owned land just north of the turning basin for the La Quinta Channel Extension. New work material at Site E would create a 120-acre upland buffer between lands to the west and the La Quinta Gateway Project. The existing site comprises uplands which include brushland. Approximately 1.0 mcy of new work dredged materials will be placed in this area to serve as a future source of landscaping for a tree-lined greenbelt separating public use lands to the west and industrial sites to the east. Best management practices on site will keep air concerns to a minimum.

Offshore placement of the new work material from the entrance channel extension is being coordinated with EPA for BU Site ZZ, the old U.S. Navy Homeport Ocean Dredged Material Dumping Site (ODMDS), under Section 404 guidelines. In this plan, approximately 2.6 mcy of new work material dredged from the entrance channel extension will be placed in the approximately 1,150-acre site, located approximately 15,300 feet southeast of the Aransas Pass South Jetty. The BUW and the RACT concurred that this Beneficial Use is preferable to general ocean placement. BU Site ZZ will provide topographic relief to the deeper offshore bay bottom, thereby enhancing the marine ecosystem in the area.

BU Site MN is approximately 440 acres and is located just outside the 30-foot contour outside the surf zone 10,000 feet south of the project channel centerline. Approximately 1.7 mcy of new work dredged material will be placed into this area, providing topographic relief to the nearshore Gulf bottom, thereby enhancing the marine ecosystem in the area.