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TERREBONNE BASIN BARRIER ISLAND & BEACH NOURISHMENT PROJECT (TE-143)

ENVIRONMENTAL ASSESSMENT
FOR ISSUANCE OF A NON-COMPETITIVE NEGOTIATED AGREEMENT FOR THE USE OF OUTER CONTINENTAL SHELF SAND

Terrebonne Parish, Louisiana

Prepared for

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF OCEAN ENERGY MANAGEMENT

On Behalf of

COASTAL PROTECTION AND RESTORATION AUTHORITY
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EXECUTIVE SUMMARY

PROJECT OVERVIEW AND PURPOSE

On behalf of the Bureau of Ocean Energy Management (BOEM) and the Coastal Protection and Restoration Authority (CPRA), the Environmental Assessment (EA) for the Terrebonne Basin Barrier Island & Beach Nourishment Project (TE-143) (hereinafter referred to as the Project) has been prepared in support of the Project permitting and coordination of a Non-Competitive Negotiated Agreement with BOEM for use of an Outer Continental Shelf (OCS) sand resource located in federally-owned waters. The Project includes restoring the geomorphic and ecological form and function (GEFF) of Trinity-East Island and Timbalier Island beach, dune, and intertidal marsh habitat through fill placement utilizing offshore sand source from South Pelto blocks 12 and 13. The operative Federal authorities for USACE permitting are Section 10 of the Rivers and Harbors Act of 1899, which regulates dredging and filling of federally owned waters and water bottoms, and Section 404 of the Clean Water Act, which regulates the discharge of dredged sediment into federally owned waters. BOEM and USACE are working collaboratively to ensure effective implementation of the required National Environmental Policy Act (NEPA) process, the required Endangered Species Act (ESA) Section 7 consultations, the Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat consultation (Section 305) the National Historic Preservation Act Section 106 process, and the Coastal Zone Management Act Section 307 consistency determination among others.

Title VII of the Water Resources Development Act of 2007 (WRDA 2007) authorized the Louisiana Coastal Area (LCA) ecosystem restoration program (LCA Program). Included within that authority was the requirement for new restoration project construction. This authorization was recommended by the Chief of Engineer's Report, dated January 31, 2005. Under Section 7006 of WRDA 2007, the LCA Program has authority for feasibility level reports for six (6) near-term critical restoration features, including Terrebonne Basin Barrier Shoreline Restoration (TBBSR) Feasibility Study. The CPRA and USACE co-sponsored TBBSR and completed the Integrated Feasibility Study and Environmental Impact Statement (USACE, 2010a) which received a favorable Chief's Report on December 30, 2010 (USACE, 2010). The TBBSR Feasibility Study was completed in compliance with the National Environmental Protection Act (NEPA).

This Project recommends to restore habitat on Trinity-East Island and Timbalier Island consistent with recommendations made in the LCA TBBSR. These Islands have been subjected to the continued erosional patterns observed along the Terrebonne Basin and are currently at a critical minimum width in some areas, which is conducive to breaching. Once a barrier island breaches and the islands become fragmented, shoreline erosion and subsequent land loss rates are

typically exacerbated (CEC, 2015). Timbalier Island has already experienced some gapping. Therefore, the timing is critical to nourish these islands to avoid major breaching and subsequent land loss.

PROJECT LOCATION

The Project Area includes the Restoration Areas on Trinity-East Island and Timbalier Island. The Project is designed to restore the geomorphic and ecologic form and function of the barrier island features at Timbalier Island and Trinity-East Island to provide and protect critical habitats. The Project Area includes three (3) borrows areas, two (2) are located in the South Pelto Borrow Area and one (1) is located in the Ship Shoal Borrow Area located approximately 12 nautical miles (NM) southwest of Timbalier island on the OCS; four (4) Pump Out Areas two of which are referenced as the Trinity-East Pump Out Areas and two of which are referenced as the Timbalier Islands; and two (2) conveyance corridors connecting the borrow areas and pump out areas with Trinity-East and Timbalier Islands. The length of the Timbalier Island Conveyance Corridor is approximately 13 NM and the length of the Trinity-East Conveyance Corridor is approximately 9 NM. The corridors were aligned to avoid potential cultural resources and oil and gas infrastructure as well as to minimize oil and gas pipeline crossings.

The Restoration areas are located in Terrebonne Parish, Louisiana, and are part of the Terrebonne Basin. The Terrebonne Basin consists of four (4) contiguous water bodies, from west to east, named Caillou Bay, Lake Pelto, Terrebonne Bay, and Timbalier Bay, separated from the open Gulf of Mexico by a series of barrier islands. Trinity-East and Timbalier Islands are located in the western central area of the Terrebonne Basin.

PLANNING AND PERMITTING PROCESS

Restoration of beach, dune, and marsh habitat on Trinity-East and Timbalier Islands were both part of the LCA TBBSR recommended plan which represented a system-wide and cost-effective approach to restoring islands within the Terrebonne Basin Barrier System with available sediment sources. As part of the LCA TBBSR effort, the U.S. Army Corps of Engineers and State of Louisiana solicited public involvement (through public scoping meetings and study updates) and agency coordination (with local, State, Federal, and tribal representatives) concerning the proposed action. In June 2012, a Chief's Report for the TBBSR study was signed by the USACE Chief of Engineering and submitted to Congress recommending the NER plan for the TBBSR study including restoration of four islands (Whiskey, Raccoon, Trinity-East and Timbalier). Funding for construction of the NER plan for the TBBSR has not been appropriated by Congress to date. The first component of the recommended LCA TBBSR plan, restoration of beach, dune, and marsh habitat on Whiskey Island, completed construction in 2018 with funding from the Natural Resources Damage Assessment (NRDA) process following the Deepwater Horizon oil spill.

PROPOSED ACTION

Trinity-East Island:

The Trinity-East Island restoration template includes a 1,000 ft wide beach on the west end of the island which is fronted by existed dune habitat. Furthermore, breach prone areas in the central portion of the island where historic canals were dug will also be filled. The Trinity-East Island

restoration features will result in the restoration of supratidal habitat (elevation between +2.0 ft and +5.0) and intertidal marsh habitat (elevations between 0.0 ft and +2.0 ft).

The Trinity-East Island supratidal and marsh features involves the placement of approximately 2.0 mcy of sand to create supratidal and intertidal marsh habitat. The supratidal habitat will be constructed at a target elevation of +5.0 ft NAVD88, with fore and back-slopes of 1V:25H. Widths range from 1,000 ft along the west component and from 55 to 995 ft on the east component. The intertidal marsh habitat will be along the northern slope of the Project feature. Assuming a 1.3:1 cut to fill ratio the recommended cut volume requirements for the sand source is approximately 2.6 mcy.

Timbalier Island:

The Timbalier Island restoration template extends along the eastern portion of the island and includes the construction of beach, dune, and marsh components. These features on Timbalier Island will result in the restoration of dune habitat (elevation > +5.0 ft), supratidal habitat (elevation between +2.0 ft and +5.0), and intertidal marsh habitat (elevations between 0.0 ft and +2.0 ft).

The Timbalier Island beach, dune, and marsh features are approximately 18,000 linear ft along the island and will require placement of approximately 4.2 mcy of sand. The dune will be constructed at a target elevation of +7.0 ft NAVD88, with fore and back-slopes of 1V:25H and a width of 100 ft at the crest. The target elevation of the beach will be +4.5 ft NAVD88, with a slope of 1V:25H from the beach berm crest extending seaward to the intersection with the existing grade. Beach widths range from 545 to 975 ft. The marsh fill will be placed to an elevation of +2.0 NAVD88 and target low lying areas of the Timbalier Island. The average marsh fill width is approximately 390 ft and will provide a suitable platform for island roll-over and migration. Assuming a 1.3:1 cut to fill ratio, the recommended cut volume requirements for the sand source to construct the beach, dune, and marsh features is approximately 5.5 mcy.

Access Corridors:

Temporary access corridors may be dredged to provide construction access on Trinity-East and Timbalier Islands. The temporary access channels will be utilized for Project duration and will be backfilled upon Project completion.

Borrow Areas:

South Pelto Lease Blocks 13 and 14 were surveyed and analyzed in connection with the Caminada Headland Beach and Dune Restoration projects (BA-45 and BA-143) (CEC, 2012 and 2013). The Caminada Headland Beach and Dune Restoration projects previously dredged sediment from portions of this borrow area under leases from BOEM (BOEM Negotiated Agreement Nos. OCS-G 34667 and OCS-G 35161). Detailed geophysical and geotechnical investigations and borrow area designs were completed on the eastern end of the South Pelto sand body. Two subareas within the lease blocks were not utilized for the BA-45 and BA-143 projects because BOEM mandated avoidance buffers around several potentially significant archaeological targets in the area. Since 2011, BOEM investigated these targets and deemed them not to be archaeologically significant and subsequently dismissed the avoidance buffer mandates required during the BA 143 project (OSI, 2012)

In addition to the remaining areas within South Pelto Lease Block 13, a target area was identified for this Project within South Pelto Lease Blocks 12, 13, 18, and 19 on the east central portion of the Ship Shoal sand body and designated as the Ship Shoal Borrow Area. As part of the TE-118 East Timbalier Restoration Project and the associated Environmental Assessment (Stantec, 2017a), this area underwent investigations of the extent of sediment resources as well as detailed

cultural resources surveys to delineate any petroleum industry infrastructure and cultural resource avoidance areas (RCG, 2017).

Excavation, Transportation, and Conveyance Methods:

As part of the Project design phase, the use of both hopper and cutterhead suction dredge alternatives for excavation, transportation, and placement were considered for conveying sediment from the Ship Shoal and South Pelto Borrow areas. The Project design was performed based on minimizing impacts to the Project Area while providing flexibility for cost effective and timely Project implementation.

It is anticipated that the preferred method of mining the sand borrow areas at the Ship Shoal and South Pelto Borrow Areas and conveying it to Timbalier and Trinity-East Island will be one of two methods. The first method is by hopper dredge. The excavated sand will be discharged into hoppers within the hull and transported to the designated pump-out areas and hydraulically unloaded. The second method involves use of a conventional cutterhead dredge, which will excavate the sand and transfer it through a spider barge distribution system into scow barges. The scows will be towed to the designated pump-out areas and hydraulically unloaded directly from the scow barges.

AFFECTED ENVIRONMENT

As required by NEPA, a broad range of resources and natural processes, from physical and biological processes and resources, as well as critical biological and cultural resources, are described for Trinity-East Island, Timbalier Island, and where relevant, the borrow areas, pump out areas, and conveyance corridors. Of particular interest are the faunal assemblages on Ship Shoal utilized by both estuarine and oceanic species assemblages; the threatened and endangered (T&E) species, particularly the avifauna (Isles Dernieres chain is designated as critical habitat for wintering piping plover); and the potential for cultural resource targets in the location of proposed Project features, borrow areas, and conveyance corridors. The Project will have either no effect or short-term negative effects on most of the features and resources, followed in the mid- to long-term by positive effects as the affected environments recover from initial disturbance and the additional habitats created mature and reach equilibrium.

Implementing the Project will restore habitat and reduce the potential of breaching in the near term on Trinity-East and Timbalier Islands. The cumulative benefit will be seen as the islands retain their form and all of the ecological benefits (pelagic and benthic estuarine productivity, wildlife habitat, Essential Fish Habitat (EFH), habitat for migratory birds, habitat for T&E species and protection of adjacent wetlands shores, etc.) into the future. The proposed restoration of the barrier shoreline and creation of new marsh will bolster the islands' ability to resist beach erosion, storm surge overwash, and breach formation.

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1.0 - INTRODUCTION

1.1 Project Authority

The Coastal Protection and Restoration Authority (CPRA) serves as applicant for a Non-Competitive Negotiated Agreement with the Bureau of Ocean Energy Management (BOEM) for use of an Outer Continental Shelf (OCS) sand resource located in federally managed waters. This Project is one (1) of several that the State of Louisiana has proposed to address the impacts of the *Deepwater Horizon* oil spill on the natural resources in the area through the Gulf Environmental Benefit Fund, which is administered through the National Fish and Wildlife Foundation (NFWF). On April 20, 2010, an explosion on the Deepwater Horizon Mississippi Canyon Block 252 (MC252) drilling platform occurred, releasing an estimated 4.9 million barrels of oil. Approximately 820,000 barrels (bbl) were directly recovered at the well site and approximately 4.1 million bbl of oil were released into the Gulf of Mexico over a period of 87 days (McNutt et al., 2011). This adversely affected large coastal areas of Louisiana (Lubchenco et al., 2010), including the TE-143 Terrebonne Basin Barrier Island Project Area. The Gulf Environmental Benefit Fund (Gulf Fund) was established by NFWF in accordance with plea agreements between BP Exploration & Production, Inc., Transocean Deepwater, Inc. (January 3, 2013), and the United States of America following the 2010 *Deepwater Horizon* explosion, oil spill, and response. The plea agreements direct a total of $2.544 billion to NFWF to fund projects that benefit resources that were impacted by the 2010 *Deepwater Horizon* explosion, oil spill, and response. Approximately $1.2 billion of the funds directed to NFWF is dedicated to targeting Louisiana impacts by using the funds solely for barrier island restoration or river diversion projects on the Mississippi and/or Atchafalaya Rivers for the purpose of creating, preserving, and restoring coastal habitat (NFWF, 2017).

The Project includes restoring the geomorphic and ecological form and function (GEFF) of Trinity-East Island and Timbalier Island through beach, dune, and intertidal marsh habitat through fill placement utilizing offshore sand source from South Pelto blocks 12 and 13.

The Consulting Team consists of Stantec Consulting Services (Stantec), New Orleans, Louisiana, and their subconsultants: Coastal Engineering Consultants (CEC), Baton Rouge, Louisiana, and Naples, Florida; Coastal Technology Corporation (CTC), Vero Beach, Florida; GeoEngineers (GEO), Baton Rouge, Louisiana; John Chance Land Surveys (JCLS), Lafayette, Louisiana; Ocean Surveys (OSI), Metairie, Louisiana, and Old Saybrook, Connecticut; and R. Christopher Goodwin & Associates (Goodwin), New Orleans, Louisiana, and Frederick, Maryland.

1.2 Project Purpose and Scope

Title VII of the Water Resources Development Act of 2007 (WRDA 2007) authorized the Louisiana Coastal Area (LCA) ecosystem restoration program (LCA Program). Included within that authority was the requirement for new restoration project construction. This authorization was recommended by the Chief of Engineer's Report, dated January 31, 2005. Under Section 7006 of WRDA 2007, the LCA Program has authority for feasibility level reports for six (6) near-term critical restoration features, including Terrebonne Basin Barrier Shoreline Restoration (TBBSR) Feasibility Study. The CPRA and USACE co-sponsored TBBSR and completed the Integrated Feasibility Study and Environmental Impact Statement (USACE, 2010a) which received a favorable Chief's Report on December 30, 2010 (USACE, 2010). The TBBSR Feasibility Study was completed in compliance with the National Environmental Protection Act (NEPA).

The TBBSR project area is part of Louisiana's critically important coastal zone, a diverse complex of ecosystems that include highly productive wetlands and fresh- and estuarine waters and water

bottoms that have high value as fish and wildlife habitat (Essential Fish Habitat, migratory bird habitat, *etc.*) as well as high commercial and recreational fishery value (finfish, crustaceans, shellfish, *etc*.). The barrier islands protect these interior environments from direct assault by tropical and extratropical storms, helping to maintain the estuarine conditions that make them so productive. In addition, the barrier islands protect a basin fringed by the public and private infrastructure associated with numerous communities that provide essential services to the offshore oil and gas industry and also filled with the private infrastructure associated with petroleum extraction and distribution. Protection and restoration of these barrier islands will prevent further degradation of these nationally important environmental and economic assets. Protection of the barrier islands and headlands of the Terrebonne Basin parallels protection of the barrier islands and headlands of the adjacent Barataria Basin, another LCA goal.

TBBSR considered significant aspects within the Terrebonne Basin including the environmental, social, and economic effects; engineering feasibility; and comments received from CPRA, the public, and other resource agencies in producing the study. The National Ecosystem Restoration (NER) Plan presented in the study was determined to be in the overall public interest, was determined to be a justified expenditure of Federal funds and was recommended for implementation. The NER Plan, comprised of Raccoon Island with Terminal Groin - Plan E (minimum design plan with twenty-five (25) years of advanced fill) / Whiskey Island - Plan C (minimum design plan with five (5) years of advanced fill) / Trinity Island - Plan C / and Timbalier Island - Plan E, would restore the geomorphological and ecological form and function (GEFF) of these four (4) islands in the Terrebonne Basin barrier system (USACE, 2010). The first recommended component of construction within the NER plan was the Whiskey Island Plan C which recently completed construction.

This Project recommends to restore habitat on Trinity-East Island and Timbalier Island consistent with recommendations made in the LCA TBBSR. These Islands have been subjected to the continued erosional patterns observed along the Terrebonne Basin and are currently at a critical minimum width in some areas, which is conducive to breaching. Once a barrier island breaches and the islands become fragmented, shoreline erosion and subsequent land loss rates are typically exacerbated (CEC, 2015). Timbalier Island has already experienced some gapping. Therefore, the timing is critical to nourish these islands to avoid major breaching and subsequent land loss.

The overarching purpose of TBBSR was to address the goal of the 2004 LCA Plan (USACE, 2004), specifically, to restore the GEFF of the barrier islands through simulation of historical conditions by enlarging the existing barrier islands, both in width and in dune crest elevation, and by reducing the number of breaches. The barrier islands are typically low lying and composed primarily of three (3) physical subaerial features: the beach, dune, and back-barrier marsh. They act as a buffer to reduce the full force and effects of wave action, saltwater intrusion, storm surge, and tidal currents on associated estuaries and wetlands. To restore their GEFF, and to provide this buffer, involves reinforcing the shoreline through beach and dune restoration. In addition, it includes providing a marsh platform to capture overwash sediments during episodic events; sediment that would otherwise be carried into back bay areas to form shoals or be lost into deeper waters. The marsh also serves as a roll over platform as the islands migrate landward. Restoration of ecologic form and function includes vegetating both the restored dunes and back-barrier marsh platforms with native plants, to provide wetland habitat for a diverse number of plant and animal species, and to help retain sediment. Barrier Islands protect the interior coastal wetlands, which also have high fish and wildlife value as well as significant economic value to commercial and recreational fisheries. The estuaries landward of the TBBSR are productive oyster habitat and have traditionally supported important fisheries. Restoration of the barrier islands will protect these national assets from further degradation.

1.3 Project Location

The Project Area (Figure 1-1) includes the Restoration Areas on Trinity-East Island and Timbalier Island. The Project is designed to restore the geomorphic and ecologic form and function of the barrier island features at Timbalier Island and Trinity-East Island to provide and protect critical habitats. The Project Area includes three (3) borrows areas, two (2) are in the South Pelto Borrow Area and one (1) is in the Ship Shoal Borrow Area located approximately 12 nautical miles (NM) southwest of Timbalier Island on the OCS; four (4) Pump Out Areas two of which are referenced as the Trinity-East Pump Out Areas and two of which are referenced as the Timbalier Islands; and two (2) conveyance corridors connecting the borrow areas and pump out areas with Trinity-East and Timbalier Islands. The length of the Timbalier Island Conveyance Corridor is approximately 13 NM and the length of the Trinity-East Conveyance Corridor is approximately 9 NM. The corridors were aligned to avoid potential cultural resources and oil and gas infrastructure as well as to minimize oil and gas pipeline crossings.

The Restoration areas are located in Terrebonne Parish, Louisiana, and are part of the Terrebonne Basin. The Terrebonne Basin consists of four (4) contiguous water bodies, from west to east, named Caillou Bay, Lake Pelto, Terrebonne Bay, and Timbalier Bay, separated from the open Gulf of Mexico by a series of barrier islands. Trinity-East and Timbalier Islands are located in the western central area of the Terrebonne Basin.

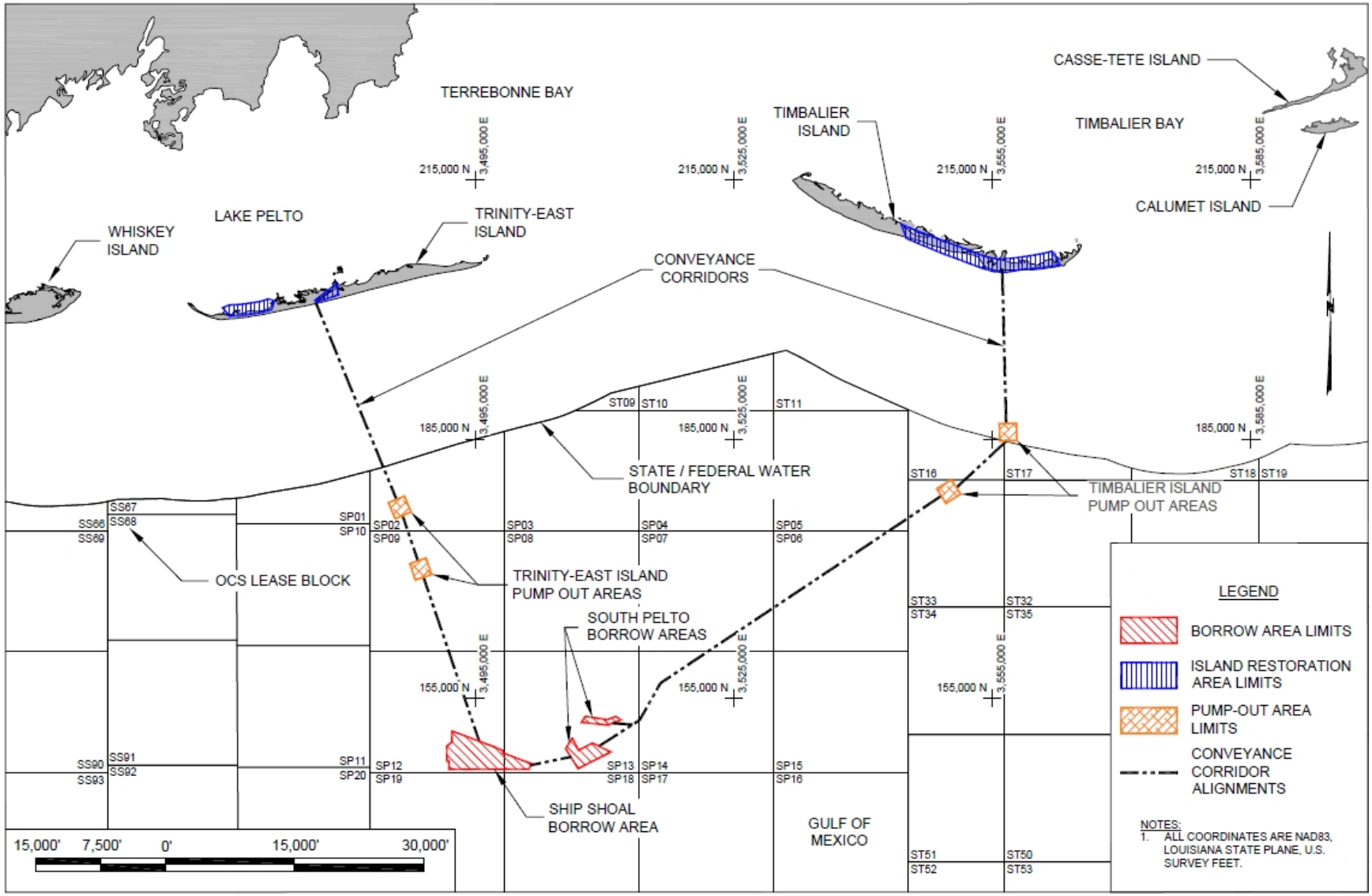

Figure 1-1. Project Area

1.4 Project History

Trinity-East and Timbalier Islands have been the subject of considerable study and numerous shoreline protection and restoration efforts since the 1980s.

Trinity-East Island

Trinity-East Island is the location of three (3) constructed Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) restoration projects. These projects include TE-20 (Isle Dernieres Restoration East Island project); TE-24 (Isle Dernieres Trinity Island project); and TE-27 (New Cut Dune and Marsh Restoration project). The aforementioned restoration projects were administered and funded through the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) with the United States Environmental Protection Agency (USEPA) serving as the federal sponsor and the Louisiana Department of Natural Resources (LDNR) serves as the local sponsor. In addition to the CWPPRA restoration projects, a restoration project on East Island was built by Terrebonne Parish Consolidated Government (TPCG) in 1985. A FEMA-funded restoration project (DRS-81560) to ameliorate the impacts of Hurricane Andrew on East Island was constructed adjacent to the previously constructed TPCG project on East Island in 1996 by LDNR.

The Trinity (TE-24) and East (TE-20) Islands and New Cut (TE-37) projects served a common goal, to restore what had formerly been a one-island reach of the Isles Dernieres. Three (3) hurricanes breached Trinity Island between 1974 and 1992, creating New Cut, with the severed eastern part of Trinity locally referred to as East Island. TE-20 and TE-24 were completed in 1999, with restoration of beach and dune and creation of bay-side marsh habitat (Rodrigue *et al*., 2008). As described above, the breach that had been New Cut naturally closed in 2007, facilitated by construction that joined the beaches and dunes of the two (2) islands (T. Baker Smith, 2007).

In 1992, the Louisiana Department of Wildlife and Fisheries acquired Trinity-East Islands as part of Isle Dernieres Barrier Island Refuge. One of the primary management goals for this refuge is to provide and protect habitat for nesting shorebirds.

Timbalier Island

Timbalier Island has been the location of two (2) constructed Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) restoration projects. These projects include TE-18 (Timbalier Island Planting Demonstration) and TE-40 (Timbalier Island Dune and Marsh Creation). In addition to the CWPPRA restoration projects, a restoration project funded by Texaco to mitigate the impact of breaching was built in 1988. Following the breach repair, Texaco funded sand fencing, vegetative planting and monitoring of the breach repair by researchers from Louisiana State University (Hester and Mendelssohn, 1992; Mendelssohn et al., 1991; and Mendelssohn and Hester, 1988). A FEMA-funded restoration project (DRS-81559) to ameliorate the impacts of Hurricane Andrew on Timbalier Island was constructed in 1996 by LDNR (Penland et al., 2003).

Since the restoration projects listed above have been constructed, these islands have been subject to the continued erosional patterns observed along the Terrebonne Basin, and are currently at a critical minimum width in some areas, which are conducive to breaching. Timbalier Island has already experienced small overwash gapping in some areas. A 2015 Technical Memorandum identified Trinity-East Island and Timbalier Island as being highly likely to breach in the near term (CEC, 2015). The impact of breaching has been documented in literature to lead to significant increases in the rate of land loss from the shorelines adjacent to the breach. In a

2003 United States Army Corps of Engineers (USACE) Technical Note on Coastal Barrier Breaching, Nick Kraus wrote that "identifying potential breaching and implementing preventative measures is less costly than closing a breach" (Kraus and Wamsley, 2003). Therefore, the timing is critical to nourish these islands to avoid major breaching and subsequent land loss.

1.5 Planning Process

Restoration of habitat on Trinity-East and Timbalier Islands was a component of the previously authorized Louisiana Coastal Area (LCA) Ecosystem Restoration Study for the Terrebonne Basin Barrier Shoreline Restoration (TBBSR) Feasibility Study and Environmental Impact Statement. Restoration of beach, dune, and marsh habitat on Trinity-East and Timbalier Islands were both part of the recommended plan which represented a system-wide and cost-effective approach to restoring islands within the Terrebonne Basin Barrier System with available sediment sources. As part of the LCA TBBSR effort, the U.S. Army Corps of Engineers and State of Louisiana solicited public involvement (through public scoping meetings and study updates) and agency coordination (with local, State, Federal, and tribal representatives) concerning the proposed action. The first component of the recommended LCA TBBSR plan, restoration of beach, dune, and marsh habitat on Whiskey Island, has recently completed construction with funding from the Natural Resources Damage Assessment (NRDA) process following the Deepwater Horizon oil spill. In June 2012, a Chief's Report for the TBBSR study was signed by the USACE Chief of Engineering and submitted to Congress recommending the NER plan for the TBBSR study including restoration of four islands (Whiskey, Raccoon, Trinity-East and Timbalier). The NER Plan would require approximately 27.3 MCY of sand (beach and dune) and 18.7 MCY of mixed sediments (marsh) for initial construction. Renourishment over the 50 year project life would require an additional 23.7 MCY of sand from offshore Borrow Areas identified as South Pelto and Ship Shoal Block 88 (USACE 2010a). Funding for construction of the NER plan for the TBBSR has not been appropriated by Congress to date.

The search for large volumes of suitable sediment resources for Louisiana barrier island restoration is a challenging effort in Louisiana's Coastal Zone which has limited sand-rich sediment resources (Kulp et al., 2005). As part of the TE-47 Ship Shoal Whiskey West Flank CWWPRA Project which was not constructed, the project team identified significant sand resources on Ship Shoal which could be used for barrier island restoration on Whiskey Island, the island adjacent to Trinity-East Island and a part of the Isle Dernieres. In support of the TE-47 project and other barrier island restoration and flood protection projects, the Minerals Management Service (MMS) completed an Environmental Assessment in 2004 which evaluated the impacts of dredging of up to 14 mcy of sand for coastal and barrier island restoration and flood protection projects from Ship Shoal using either a hopper or cutterhead dredges. As part of the 2004 EA (CSA, 2004), the MMS consulted with NOAA Fisheries for review and development of a Biological Opinion (BO) regarding hopper and hydraulic dredged associated with sand mining for coastal restoration projects along the coast of Louisiana using sand from Ship Shoal (Consultation Number F/SER/2003/01247). The borrow areas for this Project are on Ship Shoal and the sediment would be mined using either a hopper or hydraulic dredge in compliance with the reasonable and prudent measures described in the NOAA Fisheries BO from 2005 and subsequent correspondence and guidance from NOAA Fisheries.

2.0 - ALTERNATIVES

The TBBSR Integrated Feasibility Study and Final Environmental Impact Statement (FEIS) (USACE, 2010) included detailed analyses of alternative designs for individual islands and combinations of islands as well as analyses of the costs and cost-effectiveness of the alternatives.

The four-island National Ecosystem Restoration (NER) Plan recommended by the TBBSR included restoration of Timbalier and Trinity Islands to its minimal geomorphologic form and ecological function and this Project follows the design parameters set forth in the TBBSR NER Plan. The TBBSR Plan was formulated in compliance with the National Environmental Policy Act (NEPA), in coordination with the U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), and the Louisiana Department of Wildlife and Fisheries (LDWF), as per the Fish and Wildlife Coordination Act. A coordination act letter report was incorporated into the FEIS. As a consequence of all of the preceding planning and evaluation efforts, only two (2) alternatives were considered for this Project: the No-Action or Future-Without-Project Alternative and the Restoration Alternative (USACE, 2010).

2.1 No-Action Alternative

The No-Action Alternative was retained throughout the study as a basis for comparing the relative benefits and impacts of the alternatives. The No-Action Alternative involves leaving Timbalier Island and Trinity-East Island with no additional restoration effort. This alternative would allow the erosion of the islands to continue, with ever-widening breaches and storm overwash leading to an accelerated loss of adjacent estuarine wetlands and reduction of environmental and commercial benefits (CEC, 2015). As noted in the BICM Study, the average rate of shoreline change for Timbalier Island from 2004-2012 was 14.4 ft per year and for Trinity-East Island from 2004-2012 was 18.7 ft per year (Byrnes, 2017).

2.2 Design Alternative

The Project proposes to add sand material in areas most susceptible to breaching. Approximately 8.1 mcy of native seafloor material would be dredged (hydraulic cutterhead dredge and/or hopper dredge) and placed as fill for barrier island, dune, and marsh platform restoration/creation activities. The footprint of the Project would include approximately 881 acres (ac) including beach, dune, and marsh habitat that are proposed to be created as a result of the fill placement. Up to 840 ac of waterbottoms would be impacted through dredging activities at the borrow areas on Ship Shoal and South Pelto. Up to an additional 8 acres of waterbottoms may be impacted through the dredging of approximately of 70,000 cy of sediment to provide construction access on Trinity-East and Timbalier Islands. The temporary access channels will be utilized for Project duration and will be backfilled upon Project completion.

The dune platforms on the Restoration Areas will have a single row of sand fencing installed to promote deposition of windblown sand placed within the fill template. The sand fencing will be constructed of wooden slats, appropriately spaced laterally, and secured with fence wire to untreated wooden posts to form a porous barrier constructed 4 feet (ft) in height above the dune platform. Approximately 25,000 linear ft of sand fencing will be placed on the dune to capture and accumulate fine-grained sand that is transported by the wind.

Vegetative planting of the dune and marsh is a vital component of barrier island habitat restoration. The Project includes vegetation of the entire length of the dune and marsh platform at a planting density and composition similar to recent barrier island restoration planting projects in Louisiana. After construction and consolidation, the newly created marsh platform will be

planted with Smooth Cordgrass (*Spartina alterniflora* var. "*Vermilion*") and other appropriate species.

Trinity-East Island:

The Trinity-East Island restoration template includes a 1,000 ft wide beach on the west end of the island which is fronted by existed dune habitat (Figure 2-1). Furthermore, breach prone areas in the central portion of the island where historic canals were dug will be also be filled. The Trinity-East Island restoration features will result in the restoration of supratidal habitat (elevation between +2.0 ft and +5.0) and intertidal marsh habitat (elevations between 0.0 ft and +2.0 ft).

The Trinity-East Island supratidal and marsh features involves the placement of approximately 2.0 mcy of sand to create supratidal and intertidal marsh habitat. The supratidal habitat will be constructed at a target elevation of +5.0 ft NAVD88, with fore and back-slopes of 1V:25H. Widths range from 1,000 ft along the west component and from 55 to 995 ft on the east component. The intertidal marsh habitat will be along the northern slope of the Project feature (Figure 2-2). Assuming a 1.3:1 cut to fill ratio the recommended cut volume requirements for the sand source is approximately 2.6 mcy.

Timbalier Island:

The Timbalier Island restoration template extends along the eastern portion of the island and includes the construction of beach, dune, and marsh components (Figure 2-3). These features on Timbalier Island will result in the restoration of dune habitat (elevation > +5.0 ft), supratidal habitat (elevation between +2.0 ft and +5.0), and intertidal marsh habitat (elevations between 0.0 ft and +2.0 ft).

The Timbalier Island beach, dune, and marsh features are approximately 18,000 linear ft along the island and will require placement of approximately 4.2 mcy of sand. The dune will be constructed at a target elevation of +7.0 ft NAVD88, with fore and back-slopes of 1V:25H and a width of 100 ft at the crest. The target elevation of the beach will be +4.5 ft NAVD88, with a slope of 1V:25H from the beach berm crest extending seaward to the intersection with the existing grade. Beach widths range from 545 to 975 ft (Figure 2-4). The marsh fill will be placed to an elevation of +2.0 NAVD88 and target low lying areas of the Timbalier Island. The average marsh fill width is approximately 390 ft and will provide a suitable platform for island roll-over and migration. Assuming a 1.3:1 cut to fill ratio, the recommended cut volume requirements for the sand source to construct the beach, dune, and marsh features is approximately 5.5 mcy.

Access Corridors:

Temporary access corridors may be dredged to provide construction access on Trinity-East and Timbalier Islands. The temporary access channels will be utilized for Project duration and will be backfilled upon Project completion.

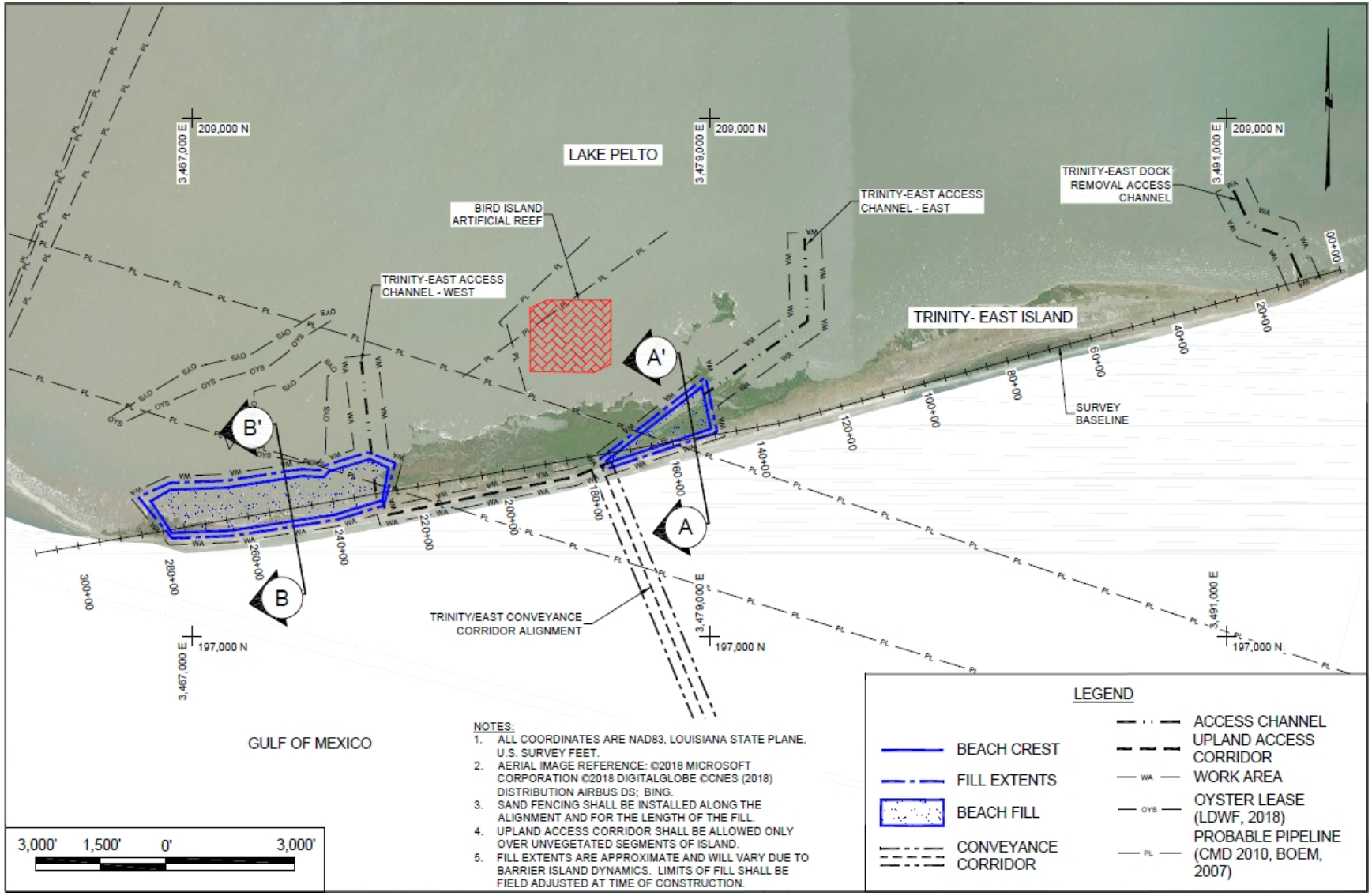

Figure 2-1. Trinity-East Island Restoration Template – Plan View

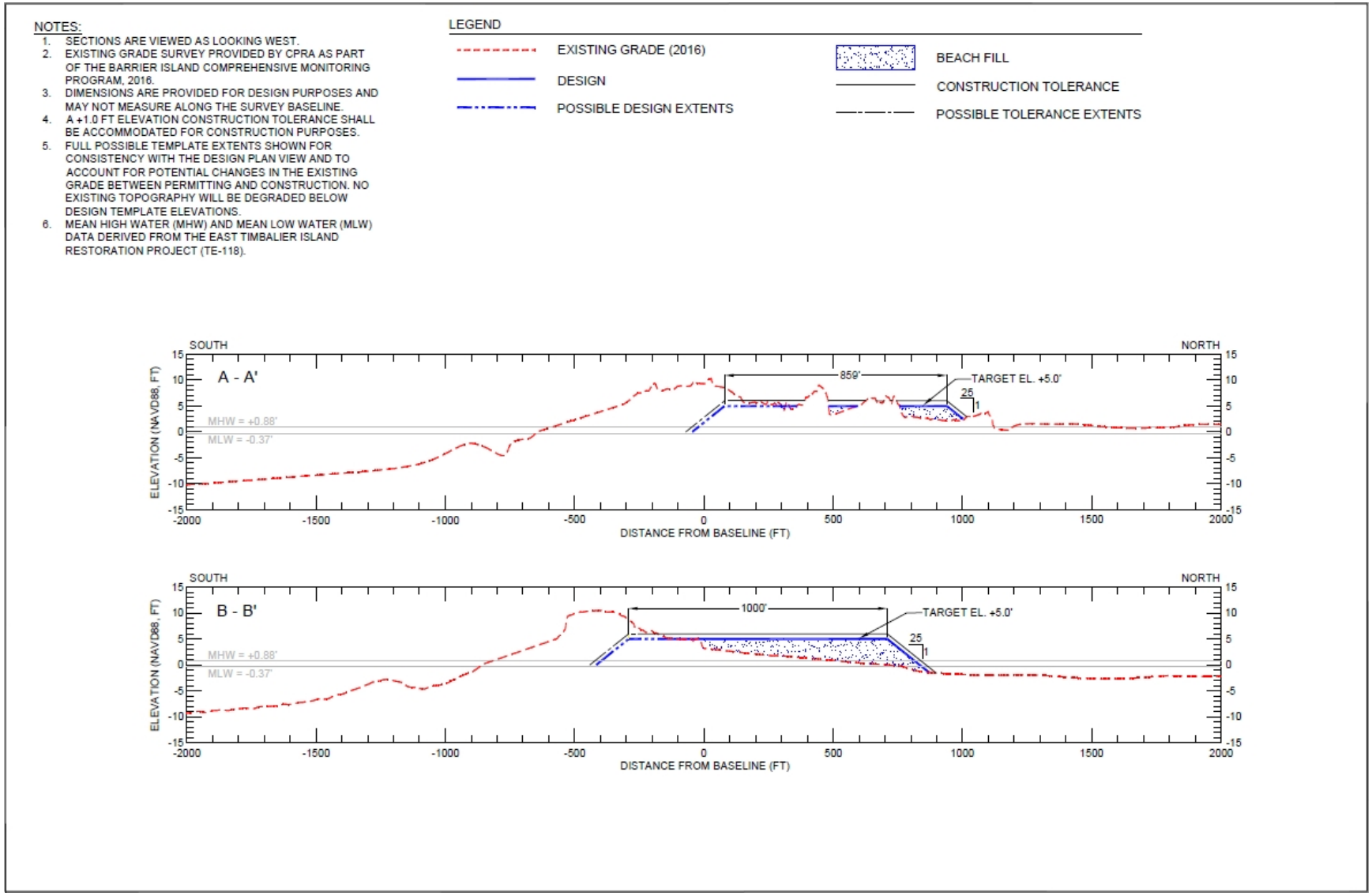

Figure 2-2. Trinity-East Island Restoration Template – Typical Sections

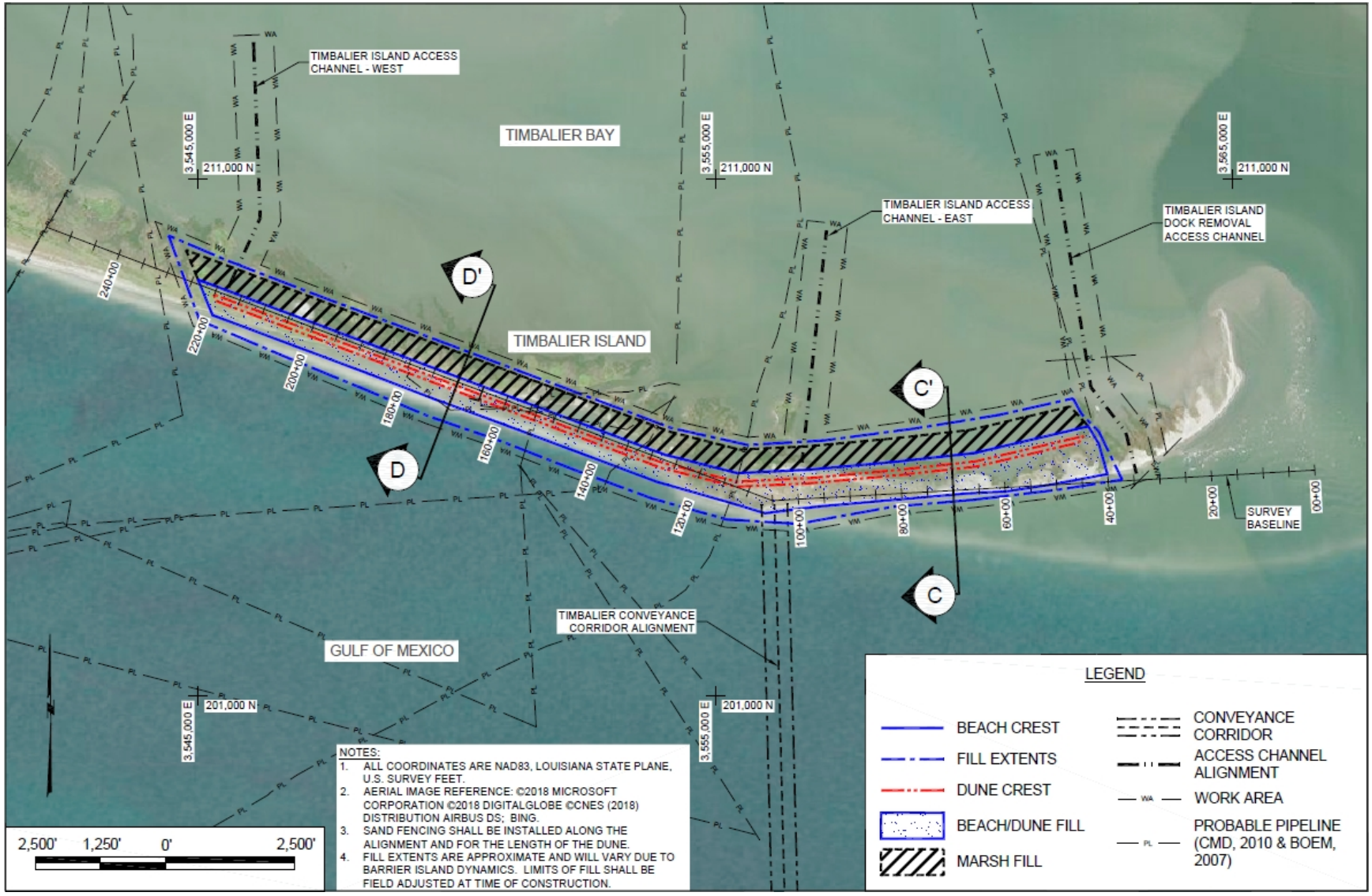

Figure 2-3. Timbalier Island Restoration Template – Plan View

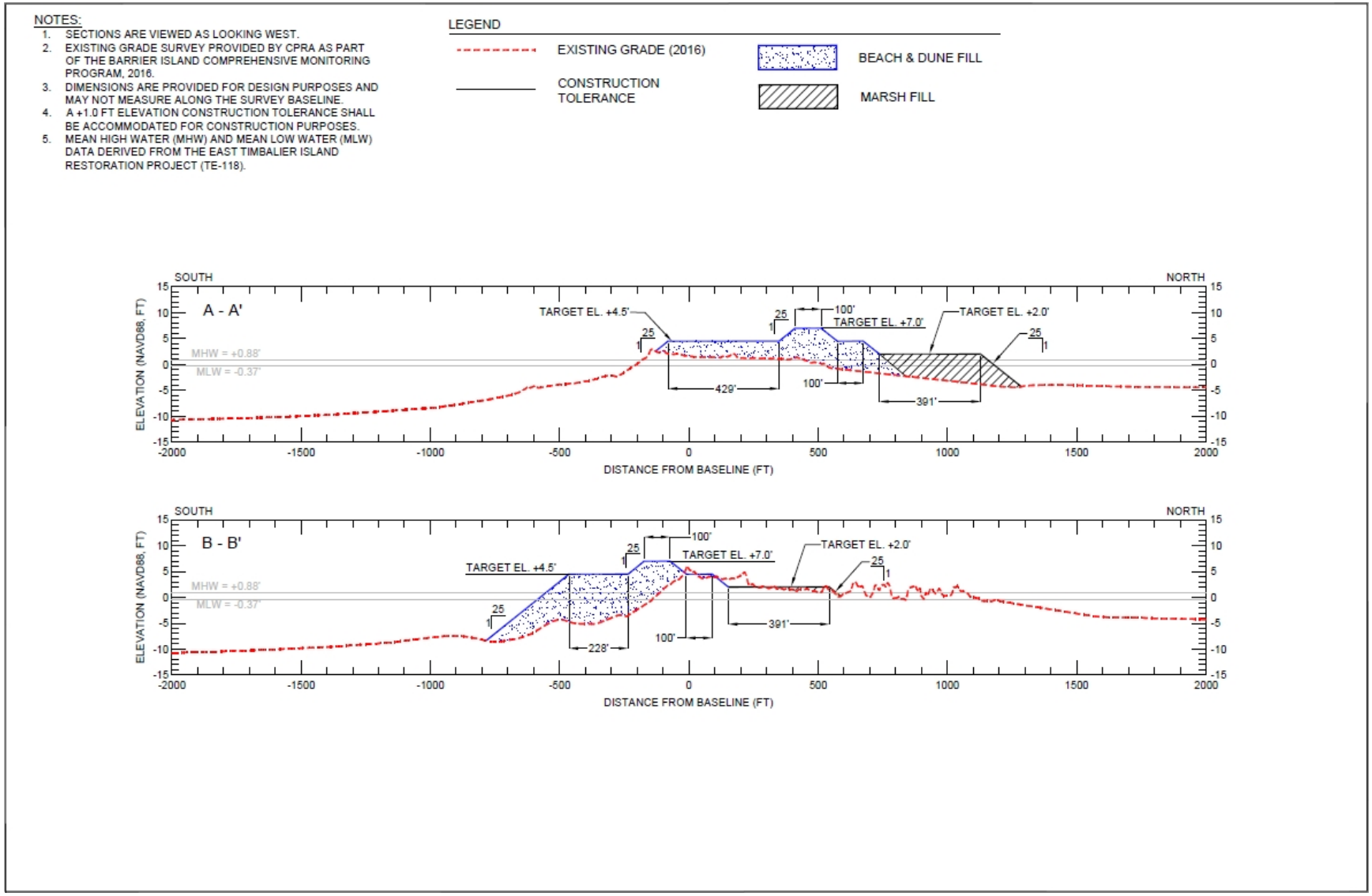

Figure 2-4. Timbalier Island Restoration Template – Typical Sections

Borrow Areas:

The search for suitable sediment resources for Louisiana barrier island restoration has been underway for several decades. Multiple target areas within the study area were identified as possible sediment resources composed of sand or mixed sediment or both. The initial screening process applied the criterion of utilizing existing or previously cleared borrow areas. The second screening process applied the additional criteria including available fill volume, adequacy and acceptability of geotechnical and geophysical survey data, and ability to obtain cultural resources clearance. The third and final criterion was a fiscal analysis, which yielded the most cost-effective sources for each specific island in the study area.

South Pelto Lease Blocks 13 and 14 were surveyed and analyzed in connection with the Caminada Headland Beach and Dune Restoration projects (BA-45 and BA-143) (CEC, 2012 and 2013). The Caminada Headland Beach and Dune Restoration projects previously dredged sediment from portions of this borrow area (Figure 2-5) under leases from BOEM (BOEM Negotiated Agreement Nos. OCS-G 34667 and OCS-G 35161). Detailed geophysical and geotechnical investigations and borrow area designs were completed on the eastern end of the South Pelto sand body. Two subareas within the lease blocks were not utilized for the BA-45 and BA-143 projects because BOEM mandated avoidance buffers around several potentially significant archaeological targets in the area. Since 2011, BOEM investigated these targets and deemed them not to be archaeologically significant and subsequently dismissed the avoidance buffer mandates required during the BA 143 project.

In addition to the remaining areas within South Pelto Lease Blocks 13 and 14, a target area was identified for this Project within South Pelto Lease Blocks 12, 13, 18, and 19 on the east central portion of the Ship Shoal sand body and designated as the Ship Shoal Borrow Area Figure 2-6). As part of the TE-118 East Timbalier Restoration Project, this area underwent investigations of the extent of sediment resources as well as detailed cultural resources surveys to delineate any petroleum industry infrastructure and cultural resource avoidance areas (RCG, 2017).

Excavation, Transportation, and Conveyance Methods:

As part of the Project design phase, the use of both hopper and cutterhead suction dredge alternatives for excavation, transportation, and placement were considered for conveying sediment from the Ship Shoal and South Pelto Borrow areas. The Project design was performed based on minimizing impacts to the Project Area while providing flexibility for cost effective and timely Project implementation.

It is anticipated that the preferred method of mining the sand borrow areas at the Ship Shoal and South Pelto Borrow Areas and conveying it to Timbalier and Trinity-East Island will be one of two methods. The first method is by hopper dredge. The excavated sand will be discharged into hoppers within the hull and transported to the designated pump-out areas and hydraulically unloaded. The second method involves use of a conventional cutterhead dredge, which will excavate the sand and transfer it through a spider barge distribution system into scow barges. The scows will be towed to the designated pump-out areas and hydraulically unloaded directly from the scow barges.

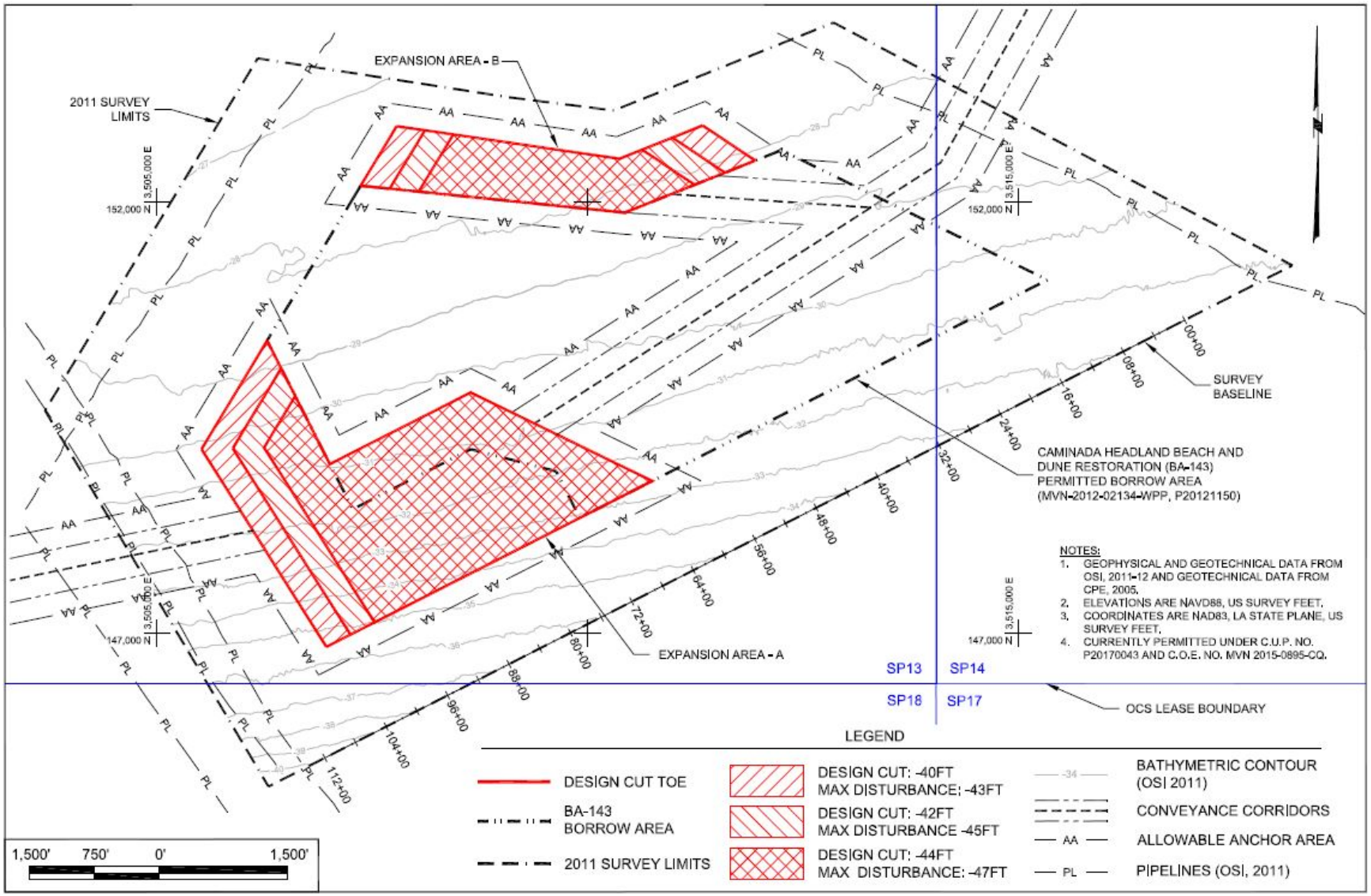

Figure 2-5. South Pelto Borrow Area

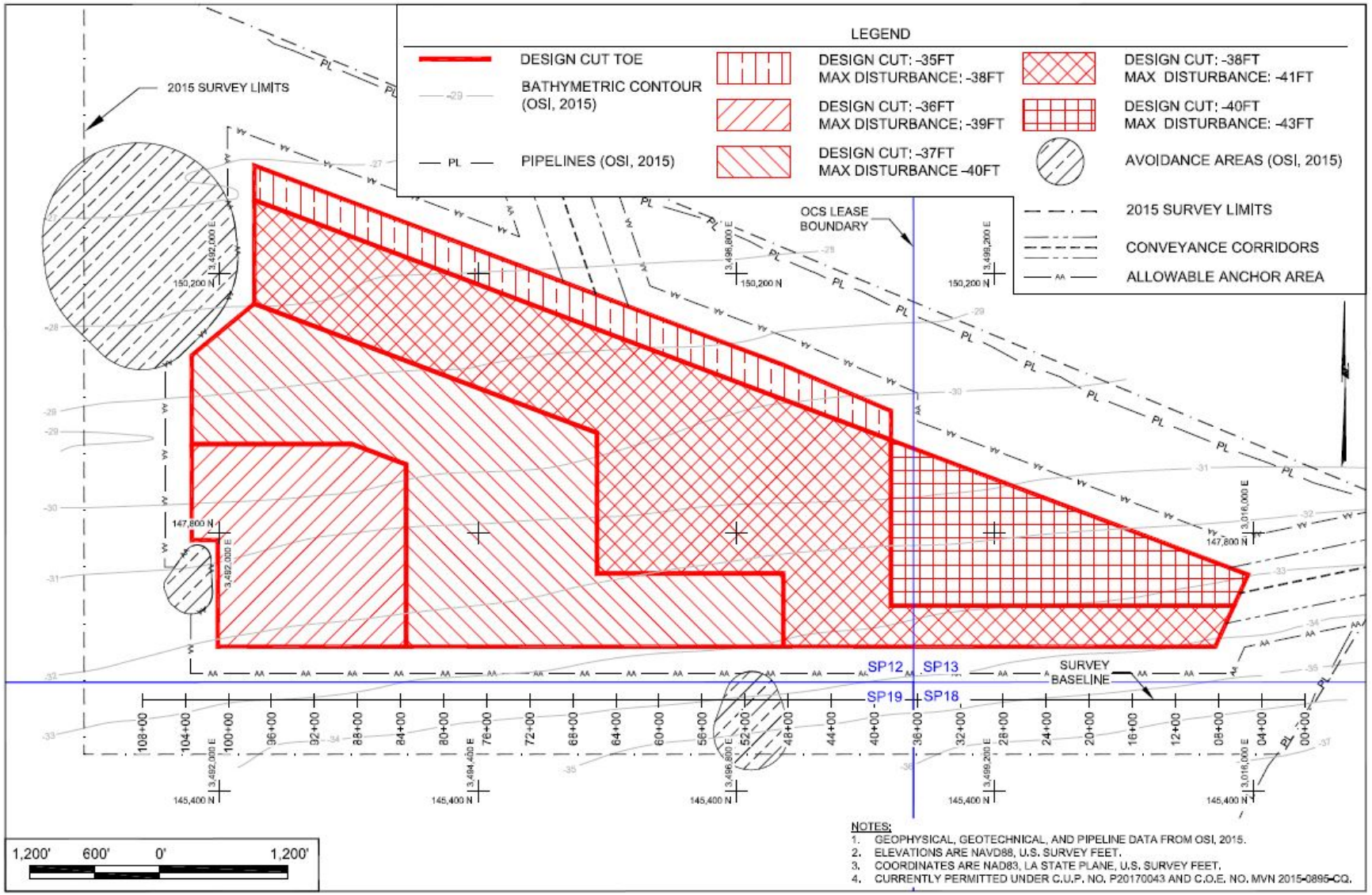

Figure 2-6. Ship Shoal Borrow Area

Conveyance Corridors and Pump-Out Areas:

Sediment delivery pipeline conveyance corridors have been delineated to connect the South Pelto and Ship Shoal Borrow Areas and Pump-Out Areas to Trinity-East Island (Figure 2-7) and Timbalier Island (Figure 2-8). Both have been thoroughly surveyed for depth, sonar targets, and magnetic anomalies and sited to avoid as many pipelines, production facilities, and cultural resource targets as possible (RCG, 2018). The corridors do not require excavation for pipeline installation, as the weighted sediment discharge pipelines will be placed directly on the seafloor.

For the Timbalier and Trinity-East Islands beach, dune, and marsh Project features requiring sand, two (2) pump-out areas have been delineated with an associated sediment delivery corridor for each island (Figure 2-7 for Trinity-East Pump Outs and Figure 2-8 for Timbalier Pump Outs). Once the sediment has reached the Island it will be handled in the normal manner. The discharge pipeline will be extended the length of the beach and dune template using pipe-handling loaders and bulldozers, and the sand will be graded to conform to the plan dimensions using bulldozers, front-end loaders, and other earth-moving equipment. Design elevation will be achieved by the construction contractor monitoring dredge discharge locations and dredged material settlement.

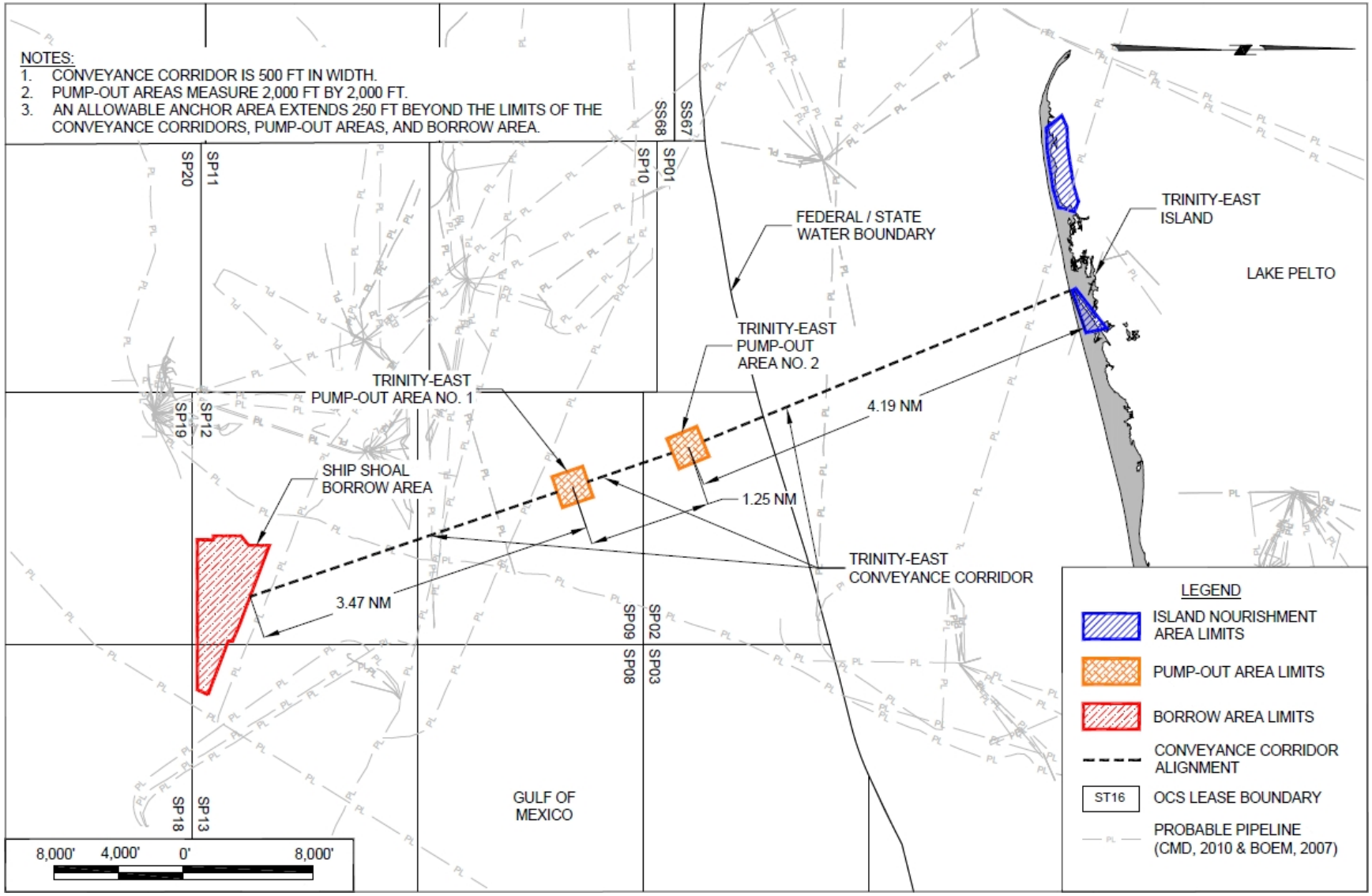

Figure 2-7. Trinity-East Conveyance Corridor and Pump-Out Areas

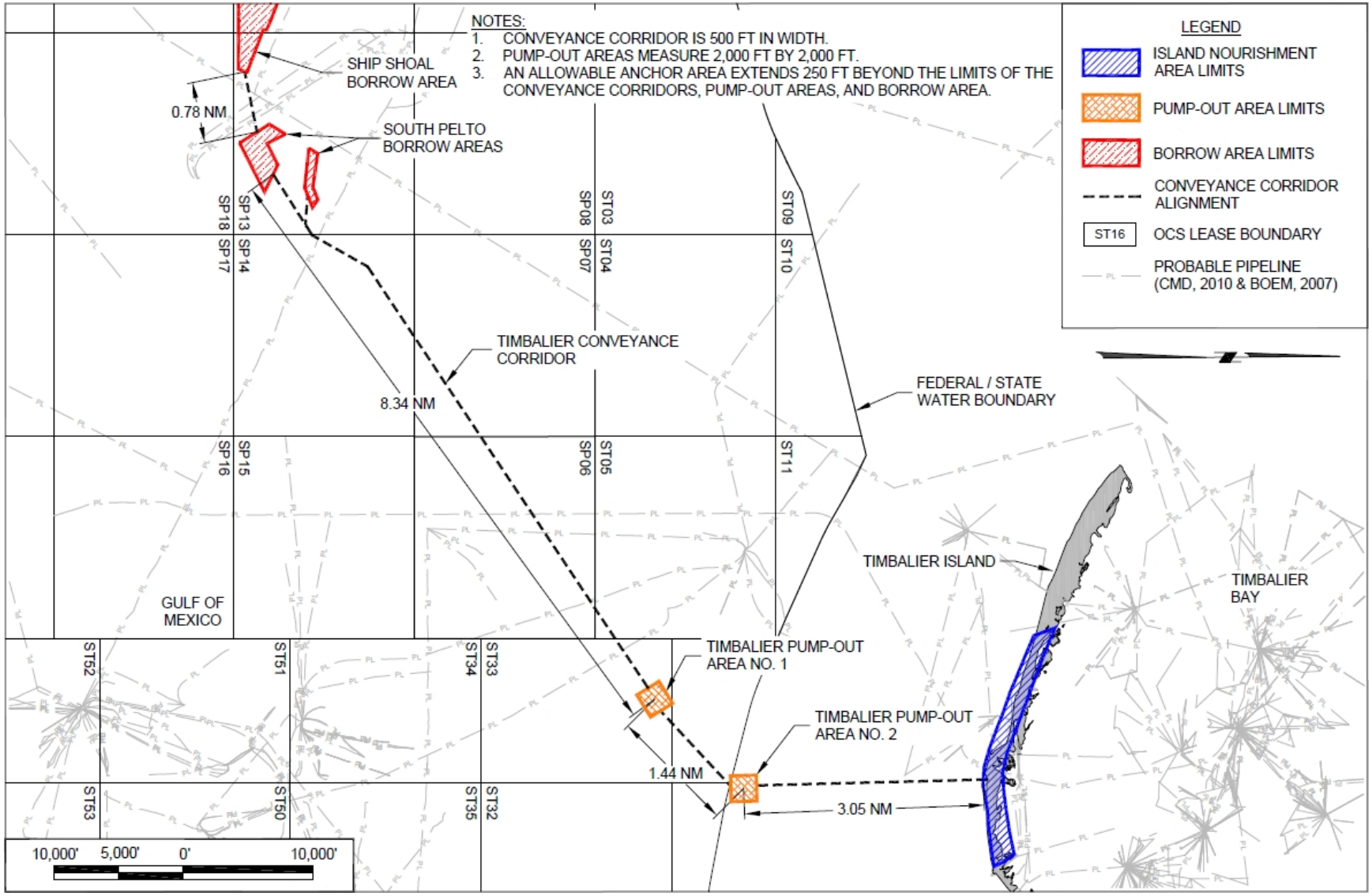

Figure 2-8. Timbalier Conveyance Corridor and Pump-Out Areas

3.0 - AFFECTED ENVIRONMENT

3.1 Soils

The soil types present in the Project Area include Felicity and Scatlake soil units (USDA, 2017). The Felicity soils are classified as poorly drained, rapidly permeable, saline sands in the beaches, dunes, and overwash regions, while the Scatlake soils are mucky clays that are primarily located in the saline marshes. The nearshore features of the barrier islands are typically flat compacted sand, with minor sandbar features in offshore water.

3.1.1 No-action Alternative

Under the No-action Alternative, the historic land loss and erosion rates will continue, and the barrier shoreline will eventually convert to shallow open water bottoms. Sand resources within the beach and dune system will be overwashed into the back-barrier system or lost offshore during significant storm events. The islands will lose their geomorphic form and function.

3.1.2 Design Alternative

Restoration of the islands by placement of approximately 6.2 mcy of beach and dune compatible sand will improve the ability of the island to resist shoreline erosion, wave overtopping, and breach formation. Installation of sand fencing and dune vegetation would provide a mechanism for future aeolian sand transport and dune enhancement for additional shoreline protection. The addition of sand from Ship Shoal would introduce sand to the sand-starved system from outside the system, which is congruent with the principles of the Coastal Master Plan (CPRA, 2017).

3.2 Water Quality

Timbalier and Trinity-East islands primarily have a sand beach facing the Gulf of Mexico with existing back barrier marsh habitat. The waters that impact the beach are from Terrebonne Basin, coastal bays, and gulf waters (subsegment 120806). The backside of Trinity-East and Timbalier Islands are marsh and faces Lake Pelto (subsegment 120805) and Timbalier Bay (subsegments 120802 and 120803), respectively. Subsegments are characterized by designated beneficial uses such as primary contact recreation, drinking water supply, oyster propagation, etc. Subsegments 120805 and 120806 currently has no water quality impairments and are meeting all beneficial uses. The 2016 Louisiana Water Quality Integrated Reports lists Subsegments 120802 and 120803 not meeting their water quality standards for Primary Contact Recreation with the suspected cause of impairment listed as residual surface and subsurface oil and the cause listed as accidental spill. Also, the 2016 Louisiana Water Quality Integrated Report listed fishing as impaired in sub-segment 120806 due to Mercury in fish tissue with the suspected cause listed as atmospheric deposition (LDEQ, 2016). The LDEQ, LDWF and Louisiana Department of Health and Hospitals issued a Fish Consumption Advisory (March 8, 2006) for king mackerel, cobia, blackfin tuna, and great amberjack caught off the coast of Louisiana due to elevated levels of mercury (LDH, 2006).

3.2.1 No-action Alternative

The No-action Alternative could potentially contribute to an increase in turbidity in the Terrebonne estuary due to increased wave actions causing greater erosion and formation of erosive, high-energy tidal surges allowing higher salinity waters of the Gulf of Mexico into interior bay waters.

3.2.2 Design Alternative

The Design Alternative would have no long-term adverse impact on present conditions. However, short-term adverse temporary impacts due to increased turbidity from placement of material on the island. The slurry discharge site for beach nourishment can contain suspended silt, clay, and organic matter, which could temporarily degrade the water quality in a dredge plume over an area ranging 5-10 ac. Other short-term impacts include: dredging in the borrow areas, digging out work areas near the fill site and backfilling them when the project is complete, pump out areas, laying pipelines, and dropping and retrieving anchors during project construction. These impacts are minor and temporary and would be limited to the construction phase of the Project. It is expected that turbidity levels would return to normal shortly after construction ended. Long-term benefits may occur due to decreased likelihood of higher wave energies resulting from the creation of wave-buffering wetlands. See Table 6.1 for avoidance, minimization and mitigation measures of the design alternative.

3.3 Noise

Noise is typically associated with human activities and habitations. However, the Project area includes remote Barrier Islands, nearshore Pump-outs, and offshore Borrow Areas. The noise from distant urban areas and oil and gas production facilities surrounding the Project area has little if any impacts on the area. As there are no noise-generation sources on Trinity-East Island, Timbalier Island or Borrow Areas, the only anthropogenic noise would be from transient vessel traffic. Since access to the Isles Dernieres Wildlife Refuge is restricted, disturbance to resident wildlife and avifauna should be minimal.

3.3.1 No-Action Alternative

There would be no impacts of the No-Action Alternative on noise specific to Trinity-East Island, Timbalier Island and the borrow areas.

3.3.2 Design Alternative

Construction activities would result in temporary and localized increases to noise levels at the dredge and associated booster pump(s) and from the equipment employed on the Island. The level of noise that is generated by construction equipment can be controlled. During the construction period, localized and temporary noise impacts would likely result in noise-sensitive wildlife and fishery resources being temporarily displaced from the Project area during construction activities. In some instances, noise impacts may directly impact fish and wildlife species. Depth sounding, and other submerged acoustic devices use a range of frequencies that may be detected by marine organisms. If disturbed, these organisms would generally avoid the construction area. However, tolerance of unnatural disturbance varies among wildlife. Best management practices shall be detailed in the Project Technical Specifications requiring the construction contractor to control noise and minimize the temporary impacts.

3.4 Air Quality

The proposed Project area lies in the Southern Louisiana-Southeast Texas Interstate Air Quality Control Region. Terrebonne Parish meets all national ambient air quality standards, according to the Louisiana Department of Environmental Quality (LDEQ) Office of Environmental Assessment, which monitors air quality at a station south of Thibodeaux (the nearest station to the proposed Project area) (LDEQ, 2017). No significant point sources of air-borne pollutants occur near the proposed Project area, and air quality is generally good. The most prominent source of airborne

pollutants in the area is the exhaust from boats. Offshore breezes mix and freshen the air, and frequent precipitation prevents accumulation of particulates.

3.4.1 No-action Alternative

The No-action alternative would have no impact on present air quality conditions. There are no air quality monitoring stations in Terrebonne Parish, although existing air quality can be considered good. Except for minor boat traffic and small oil and gas processing facilities, there are no air pollution sources located on or near the islands. The closest major sources of air pollution are 70 or more miles away in the urban-industrial corridor from New Orleans to Baton Rouge.

3.4.2 Design Alternative

This alternative would have no long-term adverse impact on present conditions. Minor temporary impacts due to emissions from diesel engines powering the dredging activities, propulsion between the dredge site and mooring buoy, and pump-out operations could occur during Project construction. Additional emissions would result from tugs and barges used in the placement and relocation of the mooring buoys. On the beach, air emissions would result from bulldozers, graders, and trucks. Emissions would occur over a period of about seven months with most of the emissions occurring at the dredge site and the mooring buoy just off the beach. Therefore, any emissions from the dredging activities would be minor, short-term emissions and would not have a long-term adverse impact on air quality conditions.

3.5 Wetland Loss

Barrier shorelines and associated back marsh areas are dynamic areas with considerable spatial and temporal variation in plant species distribution. Vegetation is one of the most important factors in trapping and retaining sediments in the barrier shoreline system. The zones or communities of barrier island vegetation and the extent of their diversity are related to elevation, degree of exposure to salt spray, and storm events that cause overwash.

Vegetation contributes to the stability of barrier islands. Vegetation traps and retains newly deposited sediment (those essential for platform accretion and dune formation) from erosion. Vegetation also contributes to soil structure, nutrients, and trophic level food supply through their decomposition, and subsequent accumulation of organic matter (detrital material). In addition to the structural and nourishment benefits, vegetation also provides habitat function and serves as an indirect indicator of wildlife and fisheries species vigor and condition (Stowe, 1982). Similarly, the types and productivity of vegetative communities are controlled by the factors that influence coastal land loss, and their ability to adapt to those conditions. The loss of wetlands has and continues to impact all vegetative community types, from the barrier islands, headlands, and salt marshes at the coastal shore, to the interior fresh marshes, swamps and bottomland forests (USACE, 2004a).

3.5.1 No-action Alternative

Without sand nourishment of the islands, marsh would continue to be lost. This alternative would allow the erosion of the islands to continue, resulting in decreasing island area and height. As noted in the BICM Study, the average rate of shoreline change for Timbalier Island from 2004-2012 was 14.4 ft per year and for Trinity from 2004-2012 was 18.7 ft per year (Byrnes, 2017). Based on the 2017 Coastal Master Plan, under the no-action, medium scenario, none of the Terrebonne Basin barrier islands will remain in 50 years.

3.5.2 Design Alternative

The direct effects of implementing the Project would result in the placement of approximately 6.2 mcy of sediment from outside of the active system within a footprint of 881 acres to create beach, dune and intertidal marsh habitat. The newly created dune and marsh platforms would be planted with native vegetation, providing for essential vegetated habitats used by wildlife for shelter, nesting, feeding, roosting, cover, nursery, and other life requirements; increased vegetation growth and productivity; and reduced inter- and intra-specific species competition between resident and non-resident fish and wildlife species for limited coastal vegetation. The Project would restore and rehabilitate dune, supratidal and intertidal vegetated coastal barrier habitats; reduce conversion of these habitats to open water habitat; and provide nursery habitat for several species, including brown and white shrimp, and blue crab.

3.6 Benthic Resources

3.6.1 No-Action Alternative

The no-action alternative would not have any direct impact on bentic resources. Existing conditions would persist.

3.6.2 Design Alternative – Trinity/East / Timbalier Island

Sediment placement temporarily affects the benthic fauna in intertidal systems by covering them with a layer of sediment. Some benthic species can burrow through a thin layer (from 15 to 35 inches for different species) of additional sediment since they are adapted to the turbulent environment of the intertidal zone; however, thicker layers (greater than 40 inches) of sediment are likely to smother the benthic fauna (Greene 2002). After beach renourishment or sediment placement, benthic fauna can take anywhere from six months to two years to recover (Rakocinski et al. 1996; Peterson et al. 2000, 2006). Such delayed recovery of benthic prey species temporarily affects the quality of piping plover foraging habitat. Additional impacts can result from laying sand transport pipeline from pump-out areas to the Fill Template. Placement of borrow area sediment could destroy any slow-moving or sessile benthic organisms within the Fill Template. These effects would be minor and short term; these benthic resources would reestablish from adjacent undisturbed areas.

3.6.3 Design Alternative – Ship Shoal / South Pelto Borrow Areas

The primary impact-producing factor affecting benthic resources would be from mechanical disturbance of the sea bottom. Physical disturbances at Ship Shoal include disruption of the sea bottom by sand removal, suspension of fine-grained sediment at the bottom and in a surface dredge plume, and dispersion and persistence of turbidity. Direct impacts would be mid-term; it would take two to three years for the dredged area to recover to existing conditions.

3.7 Fisheries Resources

Trinity and Timbalier Islands support populations of marine fisheries resources. Characteristic species include but are not limited to red drum (Sciaenops ocellatus), black drum (Pogonias cromis), Spotted seatrout (Cynoscion nebulosus), Spanish mackerel (Scomberomorus maculatus), Gulf menhaden (Brevoortia patronus), southern flounder (Paralichthys lethostigma), white shrimp (Litopenaeus setiferus), brown shrimp (Farfantepenaeus aztecus), blue crab (Callinectes sapidus), and American oyster (Crassostrea virginica). These species utilize the Project Area aquatic resources primarily as nursery, foraging, and predator refuge habitat. The emergent wetlands and associated open water habitat in the vicinity of the proposed Project

support generally decreasing populations of finfish, shellfish, birds, reptiles and mammals. Only the Spanish mackerel (Scombermorus maculatus) is believed to be increasing (USEPA, 2000).

3.7.1 No-action Alternative

Not implementing the Project will have no immediate impact on the fish and fisheries. The no-action alternative will not result in temporary impacts to fisheries or the permanent loss of sand from Ship Shoal associated with dredging. However, with continuing loss of saline marsh, shoreline, and shallow open water habitat, fish and wildlife populations would likely decline. While loss of vegetation reduces the quality of marsh as habitat for terrestrial and semi-aquatic wildlife, a short-term increase in the value of the area as a nursery and associated food source for finfish and shellfish would result. However, continued land loss leads to increasing water depth and the value of the area as a food source and nursery declines further.

3.7.2 Design Alternative – Trinity-East / Timbalier Island

This alternative would protect existing marsh, create vegetated wetlands, and reduce future land loss. As Project Area marshes are protected and enhanced, the habitat value for associated fish and wildlife species will increase and persist for a longer period of time. All Project activities will be conducted in a manner to first avoid, and otherwise minimize, any potential effects to marine fisheries.

3.7.3 Design Alternative – Ship Shoal / Pump-Outs

The Project would not likely have any adverse effects on commercial fisheries. No managed fish species specifically requires Ship Shoal or a sandy bottom substrate to sustain its life cycle. Although estuarine-dependent fish and invertebrates can be found on Ship Shoal, most do not exhibit preferences for the habitat type found in the borrow area as opposed to extensive adjacent shoal areas with equivalent habitat. Shrimp and demersal fisheries may be slightly affected by a combination of removed or degraded bottom substrates, creation of bottom topography that restricts circulation or ponds hypoxic bottom water, and temporary removal of invertebrate food sources that inhabit the borrow area. The primary impact-producing factor affecting commercial fisheries would be impacts from mechanical disturbance of the sea bottom on those fish or shellfish species with benthic lifestyles inhabiting the featureless sandy bottoms on Ship Shoal. Impacts to the shrimp fishery are expected to be negligible because brown and white shrimp appear to prefer mud bottoms (Defenbaugh, 1976; Williams, 1965). Although pink shrimp are frequently found on sand bottoms, they appear to select for calcareous sediment and are only present in the Ship Shoal area in low densities. Due to the small area, commercial fishing is unlikely to be adversely affected with respect to fisheries dependent on the bottom habitat of the borrow area, primarily shrimp trawling. Ship Shoal is an important offshore habitat for blue crab, providing spawning/hatching, foraging habitat from April to October; however, only a small portion of Ship Shoal would be dredged.

3.8 Avian Communities

Terrebonne Bay is within the Mississippi Flyway, a migratory bird corridor that extends from the Mackenzie River in Canada south to Coastal Louisiana. These coastal areas of open water and marsh provide food, cover, nesting and resting habitat. Trinity-East Island is part of The Isles Dernieres Barrier Islands Refuge, which is a series of barrier islands including Raccoon Island, Whiskey Island, and Wine Island managed by the LDWF. This refuge has been managed by LDWF since 1992, and ownership of the islands was transferred to the department in 2000. Birds that could be of concern are the piping plover, red knot, nesting migratory birds, wading birds, anhingas, cormorants, gulls, terns, and black skimmers. Of the birds listed only the piping plover

and red knot are Threatened species. Although nesting seabirds have been documented on Trinity-East Island and Timbalier, colonial nesting is not known to be currently active on the islands.

3.8.1 No-action Alternative

Not implementing the Project would create no immediate impact to the avian groups described above. The eventual disappearance of the Island would eliminate it as habitat for most avian fauna, with the exception of wading birds, since emergent marsh may persist briefly without the protection afforded by any adjacent upland.

3.8.2 Design Alternative

The construction activities and associated noise will result in disturbance to the avifauna that utilizes the Project footprint areas for nesting, roosting, and foraging, until the work is completed. Depending on the pace of construction, some species may be displaced to the remaining undisturbed marsh, but it is likely that some of the species that inhabit the undisturbed marsh areas will also be displaced to one of the neighboring islands during the construction process. A migratory bird abatement program, developed cooperatively by the CPRA and FWS, will be established to avoid or minimize impacts to the avifauna that uses Trinity-East and Timbalier Islands. Prior to construction, a qualified biologist in coordination with the LDWF and FWS will conduct a survey for bird nesting and wintering piping plover. If bird nesting or piping plover use is identified, LDWF and FWS will be notified for additional consultation. All on-site contract personnel will be informed of the need to identify colonial nesting birds and their nests, and, to the maximum extent possible avoid affecting them during the breeding season.

After Project completion, as the vegetation efforts take root, the new shoreline adjusts to the natural wave and tide regime, and their infaunal assemblages are reestablished, the avifauna will gradually become reestablished and its population numbers are expected to increase because of the increase in available habitat.

3.9 Essential Fish Habitat (EFH)

Essential Fish Habitat (EFH) is defined as waters and substrates that are necessary for fish reproduction and growth to reproductive maturity. The proposed Trinity-East and Timbalier Island Restoration (TE-143) Project affects areas designated as EFH.

As stated in the Joint Public Notice (JPN) MVN-2018-0532-CQ dated May 21, 2018, BOEM and NOAA are working collaboratively to ensure effective implementation of the required Magnuson-Stevens Act EFH consultation (Section 305). The excavation and fill tables included in the joint permit application (JPA) outline the maximum excavation/fill volumes and acreages for the borrow areas and fill areas and separate between unvegetated water bottoms, wetlands and supratidal impacts.

EFH designated in and near Trinity-East and Timbalier Islands include estuarine emergent wetlands; estuarine water bottoms (e.g., sand, shell and soft bottoms), estuarine water column, marine water column, and marine non-vegetated water bottoms (Williams, 1998). Wetlands near the Project Area are tidally influenced saline marsh and beach berm vegetated primarily with smooth cordgrass, with patches of salt grass and black mangroves (Williams, 1998).

The habitat of Trinity-East and Timbalier Islands consist of beach, low dunes, and back-barrier marsh. Spartina alterniflora (smooth cordgrass) is the dominant species of the salt marsh communities with Spartina patens Muhl. (marshhay cordgrass) and Distichlis spicata (seashore

saltgrass) also present. Avicennia germinans (black mangrove) is distributed across a large area of the island (CPRA 2012a, CPRA 2009, and Ritchie et al 1995).

The proposed fill areas, offshore sand mining sites at Ship Shoal, nearshore marsh borrow areas, pump-out areas, and pipeline conveyance corridors are in areas designated as EFH for federally managed species. Table 1 provides a summary of the EFH species listed in the Project Area, including species identified by NOAA Fisheries. These species are from the Shrimp, Red Drum, Reef Fish, Coastal Migratory, and Highly Migratory Fishery Management Plans. Detailed information on federally managed fisheries and their EFH is provided in the 2005 generic amendment of Fishery Management Plans for the Gulf of Mexico Fishery Management Council (GMFMC). The generic amendment was prepared as required by the Magnuson-Stevens Act (Magnuson-Stevens Act, P.L. 104-297).

In addition to being designated as EFH for various federally managed fishery species, wetlands and water bottoms of barrier islands, nearshore muddy sea floor, and sandy shoals in the Project Area provide unique nursery and foraging habitat for a variety of important marine fishery species such as Atlantic croaker, blue crab, gulf menhaden, spotted seatrout, sand seatrout, southern flounder, and black drum (Table 2; Williams, 1998). Some of these species serve as prey for other fish species managed under the Magnuson-Stevens Act by the GMFMC (e.g., mackerels, snappers, and groupers) and highly migratory species managed by NOAA Fisheries (e.g., billfishes and sharks). Wetlands in the Project Area also produce nutrients and detritus, important components of the aquatic food web, which contributes to the overall productivity of the Timbalier and Terrebonne Bay estuaries (O'Connell et al., 2005; Williams, 1998).

Table 3-1. EFH for the Species and Life Stages Listed in the Project Area

(NOAA Fisheries letter May 23, 2017; GMFMC 2005; Grimes et al 1990; Hoese et al 1998; Larson et al 1989; McCandles et al 2002; Muncy 1984; Starck 1971; Sutherland and Fable 1980))

(M – Marine; E-Estuarine)

Species	Life Stage	System	EFH
Brown shrimp *(Farfantepenaeus aztecus)*	eggs	M	<18-110 m; sand/shell/soft bottom
	larvae/postlarvae	M/E	<82 m; planktonic, sand/shell/soft bottom, SAV, emergent marsh, oyster reef
	juveniles	E	<18 m; SAV, sand/shell/soft bottom, emergent marsh, oyster reef
	adults	M	14-110 m; sand/shell/soft substrate
White shrimp *(Litopenaeus setiferus)*	eggs	M	<9-34 m; sand/shell/soft bottom
	larvae/postlarvae	M/E	<82 m; planktonic, soft bottom, emergent marsh
	juveniles	E	<30 m; soft bottom; emergent marsh
	adults	M	9-34 m; soft bottom
	eggs	M	Gulf of Mexico (GOM) < 46 m

Red drum *(Sciaenops ocellatus)*	larvae/postlarvae	E	all estuaries planktonic, SAV, sand/shell/soft bottom, emergent marsh
	juveniles	M/E	GOM <5 m, all estuaries, SAV, sand/shell/soft/hard bottom, emergent marsh
	adults	M/E	GOM, 1-46 m, all estuaries SAV, pelagic, sand/shell/soft/hard bottom, emergent marsh
Red snapper (*Lutjanus campechanus*)	adults	M	7-146 m; reefs, hard/sand/shell bottom
Lane snapper (*Lutjanus synagris*)	eggs	M	4-132 m: pelagic
	larvae	M/E	4-132 m; reefs, SAV
	juveniles	M/E	<20 m; SAV, mangrove, reefs, sand/shell/soft bottom
Gray or Mangrove snapper (*Lutjanus griseus*)	juvenile	E	SAV, mangrove, mud
	adult	M/E	SAV, mangrove, sand, mud
Vermilion Snapper (*Rhomboplites aurorubens*)	eggs	E	hard bottom, reef
	juveniles	E	hard bottom, reef, emergent marsh
	adult	M/E	hard bottom, reef
Greater amberjack *(Seriola dumerili)*	eggs	M	1-183 m; pelagic
	larvae	M	1-183 m; pelagic
	juveniles	M	1-183 m
Cobia *(Rachycentron canadum)*	eggs	M	pelagic
	larvae	M	11-53 m; pelagic
	juveniles	M	5-183 m; pelagic
King mackerel *(Scomberomorus cavalla)*	larvae	M	9-180 m; pelagic
	juveniles	M	<9 m; pelagic
Bonnethead shark *(Sphyrna tiburo)*	juveniles	E	<25 m; inlets, estuaries, coastal waters
	adults	M	<25 m
Atlantic Sharpnose shark *(Rhizoprionodon terraenovae)*	juveniles	E	<10 m; estuaries, coastal waters
	adults	M	1-280 m

Blacktip Shark *(Carcharhinus limbatus)*	juveniles	M/E	<30 m
	adults	M/E	<30 m
Bull Shark (*Carcharinus leucas)*	juveniles	E	<30 m
	adults	M/E	<30 m
Blacknose Shark (*Carcharhinus acronotus*)	adults	M	25-100 m
Finetooth Shark (*Carcharhinus isodon*)	juveniles	E	<20 m
	adults	M/E	<20 m

Table 3-2. Important Species and Life Stages Listed in the Project Area

(NOAA Fisheries letter May 23, 2017 & Hoese et al 1998; Leard et al 1993; Miles 1950; Odell et al 2017; Perret et al 1980; Perry and VanderKooy 2015; Peters 1989; Saucier and Baltz 1993; VanderKooy and Smith 2015; and VanderKooy 2000)

Species	**Life Stage**	**System**	**Habitat Description**
Atlantic Croaker	Larval, juvenile, and adult.	M/E	Shallow, estuarine ecosystems characterized by soft substrate (sand and mud)
Blue Crab	Larval, juvenile, and adult	M/E	Estuarine-nearshore marine environment

Gulf Menhaden	Larval, juvenile, and adult	M/E	Shallow, estuarine ecosystems
Spotted Seatrout	Larval, juvenile, and adult	M/E	Shallow, estuarine ecosystems
Sand Seatrout	Larval, juvenile, and adult	M/E	Shallow, estuarine ecosystems
Southern Flounder	Larval, juvenile, and adult	M/E	Shallow, estuarine ecosystems in association with salt marsh, mud and shell bottoms, and shoreline banks
Black Drum	Larval, juvenile, and adult	M/E	Shallow, estuarine ecosystems

3.9.1 No-action Alternative

Not implementing the restoration would result in negative EFH impacts as the gradual disappearance of the islands would reduce the productivity of its marshes and the service they provide as shelter and forage areas for numerous species of estuary-dependent fishes. The same holds true for those species that forage in the shallow foreshore, back shore, and adjacent passes. The ultimate value of the barrier islands as EFH would be reduced to the background value of the open water of Lake Pelto and Terrebonne Bay. The adjacent islands and headland wetlands that are presently protected by Trinity-East and Timbalier Islands would lose that protection, and their shorelines would degrade in a similar fashion, thus magnifying the impact on the ecology of the Terrebonne Basin.

3.9.2 Design Alternative

Implementation of restoration would result in temporary loss of prey and foraging habitat around the islands because of the turbidity from fill placement and burial of nearshore habitat (CEC, 2014 and Stantec, 2017a). Slow moving fish and benthic prey may be entrapped and smothered in the intertidal areas during sediment deposition. These impacts, however, are anticipated to be minor and would be limited to the immediate vicinity of the Project Area on Trinity-East and Timbalier Islands and for the duration of construction of the Project features. The additional area of marsh, once vegetation proceeds, will add to the productivity of the existing marsh areas and provide additional ecosystem benefits, and positively impact EFH.

3.10 Threatened and Endangered Species

There are twenty-eight (28) animal and four (4) plant species under the jurisdiction of the USFWS and/or NOAA Fisheries, presently classified as T&E within the State of Louisiana or Gulf of Mexico (GOM) waters. Of the list of T&E species that inhabit Louisiana and the Northern Gulf of Mexico, only a few are known to occur in the Project Area. Table 3-3 is a list of T&E species (USFWS, 2018) within the Project Area.

Table 3-3. Threatened and Endangered Species in Terrebonne Parish

Species	Scientific Name	Federal Status*	State Status
FISH			
Sturgeon, Atlantic (Gulf subspecies)	*Acipenser oxyrinchus desotoi*	T	T
Shark, oceanic whitetip	*Carcharhinus longimanus*	T	
Ray, giant manta	*Manta birostris*	T	
MARINE MAMMAL			
Manatee, West Indian	*Trichechus manatus*	T	E
Whale, Fin	*Balaenoptera physalus*	E	E
Whale, Humpback	*Megaptera novaeangliae*	E	E
Whale, Sei	*Balaenoptera borealis*	E	E
Whale, Sperm	*Physeter macrocephalus*	E	E
REPTILE			
Turtle, Green Sea	*Chelonia mydas*	T	T
Turtle, Hawksbill Sea	*Eretmochelys impricate*	E	E
Turtle, Kemp's Ridley Sea	*Lepidochelys kempii*	E	E
Turtle, Leatherback Sea	*Dermochelys coriacea*	E	E
Turtle, Loggerhead Sea	*Caretta*	T	T
BIRD			
Plover, Piping	*Charadrius melodus*	T, CH	T, E
Knot, Rufa Red	*Calidris canutus rufa*	T	

* *E=Endangered, T=Threatened, CH=Critical Habitat*

Source: USFWS, last updated May 4, 2016; NOAA Fisheries, accessed June 21, 2018

https://www.fws.gov/lafayette/pdf/LA_T&E_Species_List.pdf

http://sero.nmfs.noaa.gov/protected_resources/section_7/threatened_endangered/Documents/louisiana.pdf

The following sections provide the Federal status, species descriptions, and habitat information for the T&E species and critical habitat found within the Project Area. The Project Area refers to Project features on Trinity-East Island and Timbalier Island, pipeline conveyance corridors, borrow and pump-out areas. Much of this information was adapted from the Biological Assessments (BA) conducted for the Louisiana Coastal Area Terrebonne Basin Barrier Shoreline Restoration Feasibility Study (LCA TBBSR) (USACE, 2010b) and Biological Assessment for the East Timbalier Barrier Island Restoration (Stantec, 2017b).

3.10.1 Piping Plover

The threatened piping plover winters in coastal Louisiana and occurs in the vicinity of the proposed Project. Piping plovers may be present in Louisiana for 8 to 10 months, arriving from the breeding grounds as early as late July and remaining until late March or April. Piping plovers feed extensively on intertidal beaches, mudflats, sandflats, algal flats, and washover passes with no or very sparse emergent vegetation and require unvegetated or sparsely vegetated areas for roosting. Roosting areas may have debris, detritus, or micro-topographic relief offering refuge to plovers from high winds and cold weather. In most areas, wintering piping plovers are dependent on a mosaic of sites distributed throughout the landscape, as the suitability of a particular site for foraging or roosting is dependent on local weather and tidal conditions. A study of 48 wintering piping plovers in south Texas found a mean home range size of 3,117 ac, with a mean distance moved per individual of approximately 2 miles. Plovers may move among sites as environmental conditions change.

On January 10, 1986, the piping plover was listed as endangered in the Great Lakes watershed and threatened elsewhere within its range, including migratory routes outside of the Great Lakes watershed and wintering grounds (50 FR 50726). On July 10, 2001, NMFS designated critical habitat for wintering piping plovers (Federal Register Volume 66, No. 132).

Critical habitat for piping plover in Louisiana encompassed 24,950 acres (ac) along 342.5 miles of shoreline at the time of designation. The critical habitat designated in the Project Area includes the Isles Dernieres chain (Trinity-East Island) and Timbalier Island to East Grand Terre Island and is described in detail as follows:

- Unit LA-4: Isles Dernieres. 795 ha (1,964 ac) in Terrebonne Parish. This unit includes the State-owned Isles Dernieres chain, including Raccoon, Whiskey, Trinity and East Islands. This unit includes the entire islands where primary constituent elements occur to the MLLW.
- Unit LA-5: Timbalier Island to East Grand Terre Island. 5,735 ac (2,321 ha) in Terrebonne, Lafourche, Jefferson, and Plaquemines Parishes.

3.10.2 Red knot

Red knot numbers increase in April and early May with a peak count documented in southeast Louisiana of 530 individuals on Grand Isle on 1 May 2004. More recently, the Barataria-Terrebonne National Estuary Program (BTNEP) has been recording presence of red knots on 13 miles (21 km) of shoreline at Caminada Headland during bi-monthly wintering shorebird compliance surveys for piping plover (BTNEP, unpublished data). Recent research of the eBird database recorded a peak of 200 individuals on Trinity on 19 May 2010 and 149 individuals on Timbalier Island on 14 May 2010.

The red knot was proposed as a threatened species on September 30, 2013, due to loss of both breeding and nonbreeding habitat; potential for disruption of natural predator cycles on the breeding grounds; reduced prey availability throughout the nonbreeding range; and increasing frequency and severity of asynchronies (“mismatches”) in the timing of the birds’ annual migratory cycle relative to favorable food and weather conditions. On December 11, 2014, the rufa red knot was listed as a threatened species under the Endangered Species Act of 1973, as amended.

3.10.3 Sea turtles

Sea turtles require three major habitats: nesting beaches, pelagic developmental habitats, and benthic feeding habitats for juveniles and adults. It is possible that any of these species of sea turtles - Kemp’s ridley, the loggerhead turtle, the green turtle, the hawksbill turtle, and the

leatherback turtle - could be found along the Louisiana coast, although occurrences of hawksbill and leatherback turtles would be extremely rare. The hawksbill is rare in the gulf and leatherbacks prefer offshore waters.

3.10.4 Whales

Sperm whales occur in the GOM but are rare in inshore waters. Other endangered whales, including North Atlantic right whales and humpback whales, have been observed occasionally in the GOM. The individuals observed have likely been inexperienced juveniles straying from the normal range of these stocks. Blue, fin, or sei whales would not be adversely affected by hopper dredging operations; the possibility of dredge collisions is remote since these are deepwater species unlikely to be found near hopper dredging sites. There has never been a report of a whale taken by a hopper dredge. Based on the unlikelihood of their presence, feeding habits, and very low likelihood of hopper dredge interaction, the above-mentioned cetaceans are not considered further in this Assessment.

3.10.5 West Indian Manatees

West Indian manatees do not live in Louisiana year-round. They are a transient species in Louisiana and native to Florida. They periodically travel along the northern Gulf Coast from Florida during the summer months toward Alabama, Mississippi, Louisiana and Texas and may spend some time during the summer in Louisiana. They occasionally enter Lakes Pontchartrain and Maurepas; and associated coastal waters and streams during the months of June through September. Manatees have been regularly reported in the Amite, Blind, Tchefuncte, and Tickfaw Rivers, and in canals within the adjacent coastal marshes of Louisiana. Elsewhere along the Louisiana Gulf coast, manatee sightings are limited and have only been occasionally observed. Manatees were down-listed from endangered to threatened in 2017 because of an increase in manatee populations and the success of conservation and habitat restoration efforts. Treats to the manatee populations are due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution. Cold weather and outbreaks of red tide also adversely affect these animals.

3.10.6 No-Action Alternative

The only T&E species that may occur in the Project Area is the piping plover and the Isles Dernieres and Timbalier Island are designated critical habitat for it. As the Island degrades the preferred piping plover habitat, sparsely-vegetated sand (supratidal beach and dune and overwash fans, and their foraging areas, intertidal beach, sand- and mud-flats) will gradually disappear, and the plover habitat along with it.

3.10.7 Design Alternative

Restoration of the islands will displace piping plover and red knot during construction. Employment of a cooperatively-developed shorebird protection plan (CPRA and USFWS) will address measures to minimize disturbance during construction. The recommendations developed by USFWS for their TBBSR LCA project Biological Opinion will be adapted for the Terrebonne Basin Barrier Island Project. Following Project completion, the available habitat for wintering piping plover and red knot sheltering and foraging will be increased, to the direct benefit of both species. Recent research (Schupp et al., 2012) has reinforced the importance of long-term maintenance of overwash features to support the piping plover population.

Construction of the recommended project alternatives on Trinity and Timbalier Islands do not require construction of containment dikes as is common on many barrier island and restoration

projects therefore, the risk of entrapment of marine mammals such as dolphins, turtles, manatees, and Gulf sturgeon is likely very low.

The recommended alternative proposed use of cutterhead or hopper dredges at the borrow areas. The use of cutterhead dredges pose minimal threat to marine turtles. There is a slight risk of collision with service vessels (tugs, crew boats) operating around the dredge and scows. This risk also applies to the West Indian manatee. These risks are addressed through the Project Technical Specifications that require the construction contractor to adhere to the federal manatee protection conditions such as use of spotters and warning signage on the dredge and service vessels.

The use of a hopper dredge could impact sea turtles at the borrow areas through entrainment and dismemberment in dredge suction draglines, or collisions with the dredge or service vessels. Hopper dredge drag heads can catch and kill turtles. Historically, sea turtle takes associated with sand mining activities for beach restoration have been few compared to channel dredging, especially for projects in OCS Waters. Dredging with hopper dredges for Gulf beach nourishment projects could occasionally kill sea turtles, particularly loggerheads and Kemp's ridleys. The chances of the proposed Project affecting hawksbills are discountable (NMFS, 2005). Leatherbacks are unlikely to be found associated with relatively nearshore, shallow borrow areas and thus are unlikely to be impacted by hopper dredging activity or relocation trawling associated with the proposed action (NMFS, 2005). Mitigation measures such as turtle observers, paint test inspection, and relocation trawling will minimize the potential for collisions with sea turtles and incidental takes. All terms and conditions and conversation recommendations of the NMFS biological opinion (BO) (NMFS, 2005) will be adhered to for this Project.

3.11 Cultural Resources

Cultural resources include historic properties, which are defined under the National Historic Preservation Act (NHPA) of 1966, as amended (36 CFR 800), as pre- or post-contact period sites, districts, structures, buildings, objects, or features that are made or modified in the course of human activities. Their discovery, assessment, and management are mandated through Section 106 of the NHPA, which requires Federal agencies to take into account the effect of their undertakings (e.g., projects requiring Federal review and permitting) on properties listed in or eligible for listing in the National Register of Historic Places (NRHP) and to afford the Advisory Council on Historic Preservation (ACHP) as well as other Federal agencies, Tribes, State and local agencies and other interested parties an opportunity to comment on the proposed undertaking. For onshore, nearshore, and offshore components of this proposed Project, the BOEM, the USACE, the State Historic Preservation Offices (SHPO) which in Louisiana operates within the Louisiana Department of Culture, Recreation & Tourism's (CRT) Office of Cultural Development's Division of Archaeology (LADOA) and Division of Historic Preservation (DOHP), as well as the Federally-recognized Chitimacha Tribe, Terrebonne Parish, and other interested parties, have been consulted to assist in the determination of NRHP eligibility of cultural resources and provide guidance and recommendations concerning the treatment of any identified historic properties on land and underwater. Other pertinent authorities and guidelines applicable to cultural resources are the Archeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, the Archeological and Historic Preservation Act, the Abandoned Shipwreck Act of 1987.

3.11.1 Terrestrial Cultural Resources

As a component of the TBBSR study, a cultural resource assessment was conducted for six (6) areas of potential effect (APEs) encompassing the Isles Dernieres and the Timbalier Islands (Nowak et al., 2011). The cultural resource assessment reviewed the geomorphology, prehistory, history and archaeology of the Isle Dernieres and Timbalier Islands to ascertain the probability for the presence of significant cultural resources, i.e., those archaeological sites and other historic properties possessing the qualities of significance and integrity defined by the National Register of Historic Places Criteria for Evaluation (36 CFR 60.4[a-d]).

The review and correlation of the geomorphology of the study area with the regional prehistory and archaeological record of this part of south Louisiana indicated a low probability for significant prehistoric archaeological sites or prehistoric watercraft within the barrier island APEs. Additionally, any prehistoric archaeological remains that exist within these areas likely will consist of reworked and/or redeposited accumulations of cultural materials lacking integrity and having little research value (36 CFR 60.4[d]).

3.11.2 Timbalier Island – Conveyance Corridors, Hopper and Scow Pump-outs

Ocean Surveys Inc. (OSI) conducted a detailed geophysical survey of the conveyance corridor from Ship Shoal to Timbalier Island during the period April 19 to May 11, 2018. Timbalier Island pipeline conveyance corridors will pass through South Pelto Lease Blocks 13, 14, 7, 6 and South Timbalier Blocks 33, 16 and 17 before passing through Louisiana state waters to the island; the proposed pump-outs (hopper and scow) are located in federal waters. The corridor encompassed 1959.99 ac (793.18 ha) and resulted in survey of approximately 221.52 linear nautical miles (410.25 km) of transects spaced at 98.0 ft (30.0 m) intervals (RCG, 2018).

No wrecks or obstructions were recorded by NOAA/OCS (2018) within or immediately adjacent to the conveyance corridor; however, the BOEM (2017) database recorded one (potential) unidentified vessel, in proximity to the Hopper Pump-out. The unidentified vessel corresponded to a reported fishing hang in 2002 (BOEM 2017: 11851). OSI collected data along five additional reconnaissance survey lines over wreck's charted location to validate its position. No side scan sonar contacts or magnetic anomalies were recorded that correspond with this shipwreck (RCG, 2018).

Three targets that represent potential cultural resources were identified during analyses. Targets TIM_01 comprises two magnetic anomalies (M21 and M22), TIM_02 comprises one magnetic anomaly and side scan sonar contact (M254 and S21), TIM_03 comprises seven magnetic anomalies (M257, M258, M262, M33, M34 and M527) and TIM_04 comprises two magnetic anomalies (M326 and M479). All targets likely represent submerged cultural resources which were recommended for avoidance with protective buffers (RCG, 2018).

3.11.3 Ship Shoal to Trinity-East Island - Conveyance Corridors, Hopper and Scow Pump-outs

OSI conducted a detailed geophysical survey of the conveyance corridor from Ship Shoal to Trinity-East Island during the period May 15-18, 2018. The corridor encompassed 1,516.60 ac (613.75 ha) and resulted in survey of approximately 160.66 linear nautical miles (297.54 kilometers [km]) of transects spaced at 98.0 ft (30.0 m) intervals. Three targets that represent potential cultural resources were identified during analyses. Targets TRI_01 comprises one magnetic anomaly (M210), TRI_02 comprises two magnetic anomalies (M137 and M228), and TRI_03 comprises one magnetic anomaly (M596). All targets likely represent submerged cultural resources and were recommended for avoidance with protective buffers (RCG, 2018).

No wrecks or obstructions were recorded within or immediately adjacent to the corridor (BOEM 2017; NOAA/OCS 2018).

3.11.4 Ship Shoal to South Pelto Borrow Area – Conveyance Corridor

OSI conducted a detailed geophysical survey of the conveyance corridor on April 29 and May 5, 2018. The corridor extends between the two BOEM approved borrow areas on Ship Shoal comprised of South Pelto Lease Blocks 9 and 2 supporting Trinity-East Island and those supporting Timbalier Island located in South Timbalier Blocks 33, 16 and 17. The corridor encompassed 118.8 ac (48 ha) and resulted in survey of approximately 8.3 linear nautical miles (13.4 km) of transects spaced at 98.0 ft (30.0 m) intervals (RCG, 2018). No anomalies were identified in this area of the investigation that warranted recommendation for avoidance.

No charted wrecks or obstructions were recorded within or immediately adjacent to the conveyance corridor (BOEM 2017; NOAA/OCS 2018).

3.11.5 Borrow Areas

Ship Shoal Borrow Area

OSI conducted geophysical and geotechnical investigations during the period 14 – 21 May and 3 – 8 October 2015 at Ship Shoal in the Gulf of Mexico, approximately 9 nm south of the Isles Dernieres, Louisiana. The proposed borrow area is located within the east central portion of Ship Shoal, at BOEM South Pelto Lease Blocks 12 and 13. The survey investigated an area approximately 2.0 x 1.2 nm, which included the proposed borrow area and a 1,000 ft (304.8 m) buffer around its perimeter. In total, approximately 108 nm of survey tracklines were investigated in the Ship Shoal Borrow Area to support the Project.

An obstruction is plotted in the southern portion of the Ship Shoal Borrow Area within the borrow area limits. However, no side scan sonar contacts or magnetic anomalies were recorded that correspond with this obstruction. The wreck, Carl Tide, lost in 1965, plots in the southern portion of the Ship Shoal Borrow Area. It is located within the study area limits but outside the borrow area limits (RCG, 2017). No side scan sonar contacts or magnetic anomalies were recorded that correspond with this shipwreck (USDOI, BOEM 2015).

South Pelto Borrow Area

Geophysical/geotechnical/marine archaeological identification survey of the Ship Shoal Borrow Area and Expansion Area situated within the BOEM's South Pelto Lease Blocks 13 and 14 was performed for the Caminada Headland (BA-45) project in 2011 (OSI, 2011). Analysis of the magnetometer data identified a total of 98 magnetic anomalies (see tables and drawings in OSI 2011), as well as four linear alignments of anomalies that correlate with charted pipelines located outside of the proposed borrow area limits (i.e., two along the southwestern edge, one along the western edge, and one along the northeastern edge of the surveyed borrow area). Based on Fathom's archaeological assessment of OSI's remote-sensing data, all of the magnetic anomalies and side scan sonar targets identified as potential shipwrecks or shipwreck materials can be protected by maintaining the recommended 500-ft radius buffers zones (Fathom Research, 2012); none of them lies within the proposed borrow area. Provided that the recommended buffers are maintained, the proposed dredging activities will not impact any anomalies or targets identified as potential submerged cultural resources, and no additional investigation was recommended.

3.11.6 No-Action Alternative

Based on the previous archeological investigations described herein, there are no identified cultural resources at Trinity-East and Timbalier Island, thus the No-Action Alternative will not have any effect on cultural resources.

3.11.7 Design Alternative

The borrow areas and conveyance corridors have been designed to provide the recommended avoidance buffers developed from the Phase I surveys during the design process for the Project (Goodwin, 2018), thus no historic properties will be affected within the Borrow Areas, Pump-Outs or within the conveyance corridors, as proposed.

3.12 Recreation

The barrier islands have recreational value due to the unique location between the gulf and inland marshes. Recreational fishing on gulf beaches is often very productive and is enjoyed by many recreational fishermen. In addition, birding, picnicking and overnight camping are allowed in the public use area on Trinity Island (LDWF, 2018).

3.12.1 No-action Alternative

Future recreational use will decrease as erosion continues to degrade beach habitat and as wetland deterioration is exacerbated, leading to declines in fisheries, nursery, and wildlife habitat.

3.12.2 Design Alternative

This alternative would beneficially affect recreational fishing, birding and camping. Project components may provide for greater long-term productivity and viability of Project Area beach, dune, and marsh, thus contributing to the stability of fish and wildlife populations. Some temporary adverse short-term impacts to recreation would occur as a result of filling and construction activity. These include avoiding fill areas until compaction and re-vegetation are completed, increased turbidity of surface waters, and increased noise within the Project Area during construction.

4.0 - OTHER ENVIRONMENTAL CONSIDERATIONS

4.1 Cumulative Impacts

4.1.1 Future Projects in the Project Area

The State of Louisiana and the federal government have invested hundreds of millions of dollars over the past two decades restoring its barrier islands and shorelines and plans to continue to invest in maintaining these features (CPRA, 2017). CPRA intends to monitor and assess the Terrebonne, Timbalier, and Barataria barrier islands and shorelines as part of a regular rebuilding program. The barrier island program will allow CPRA to respond when catastrophic events like future hurricanes impact the area. One and a half billion dollars of the $50 billion restoration budget has been identified to fund the Barrier Island Program (CPRA, 2017).

4.1.2 Cumulative Effects

Direct and indirect impacts of past, present and reasonably foreseeable future events were considered in the analysis of the proposed Project consequences. These impacts include historical and predicted future land loss rates for the area and other restoration projects in the vicinity. The preferred alternative would have temporary adverse impacts to some environmental resources but cumulative benefits to the environmental resources (CEC, 2014 and Stantec, 2017a).

Implementing the Project will restore habitat and reduce the potential of breaching in the near term on Trinity-East and Timbalier Islands. The cumulative benefit will be seen as the islands retain their form and all of the ecological benefits (pelagic and benthic estuarine productivity, wildlife habitat, EFH, habitat for migratory birds, habitat for T&E species and protection of adjacent wetlands shores, etc.) into the future.

Cumulative effects on the Ship Shoal sand resources would be minor, even in combination with other planned Federal and State utilization of Ship Shoal for restoration efforts. Ship Shoal encompasses approximately 76,600 acres and contains an estimated 1.57 billion cubic yards of very fine- to medium-grained sand (DOI-MMS 2004; USACE 2012). Removal of up to 8.2 MCY of sand from approximately 840 acres of South Pelto and/or Ship Shoal for restoration of the Trinity-East and Timbalier Islands is considered small-scale mining in the context of the various Ship Shoal modeling studies (Stone, 2000, Stone et al., 2004, 2009). The Project would directly impact approximately 1 percent of the surface area of Ship Shoal and less than 0.5 percent of the total volume of sand resources present on the shoal. It is noted that previous project have dredged sand resources from Ship Shoal and the quantity of sediment removed is less than 4 percent and area directly impacted by dredging is approximately 2 percent.

Some minor impacts on the benthic community would occur, including turbidity, burial, changes in sediment parameters and suitability, and sediment resuspension. These effects are minor and short-term, and there would be little to no cumulative effects.

4.2 Oyster Leases

There are three oyster leases (Figure 4-1 close to the Trinity-East Island Restoration Project features). All three oyster leases (2720309, 2719909, and 2720309) are owned by the same owner and will not expire until 2024. It is noted that the Project features were configured to avoid impacting the existing oyster leases by providing a buffer of approximately 150 ft between the nearest boundary of the oyster leases and the Project footprint (fill extents).

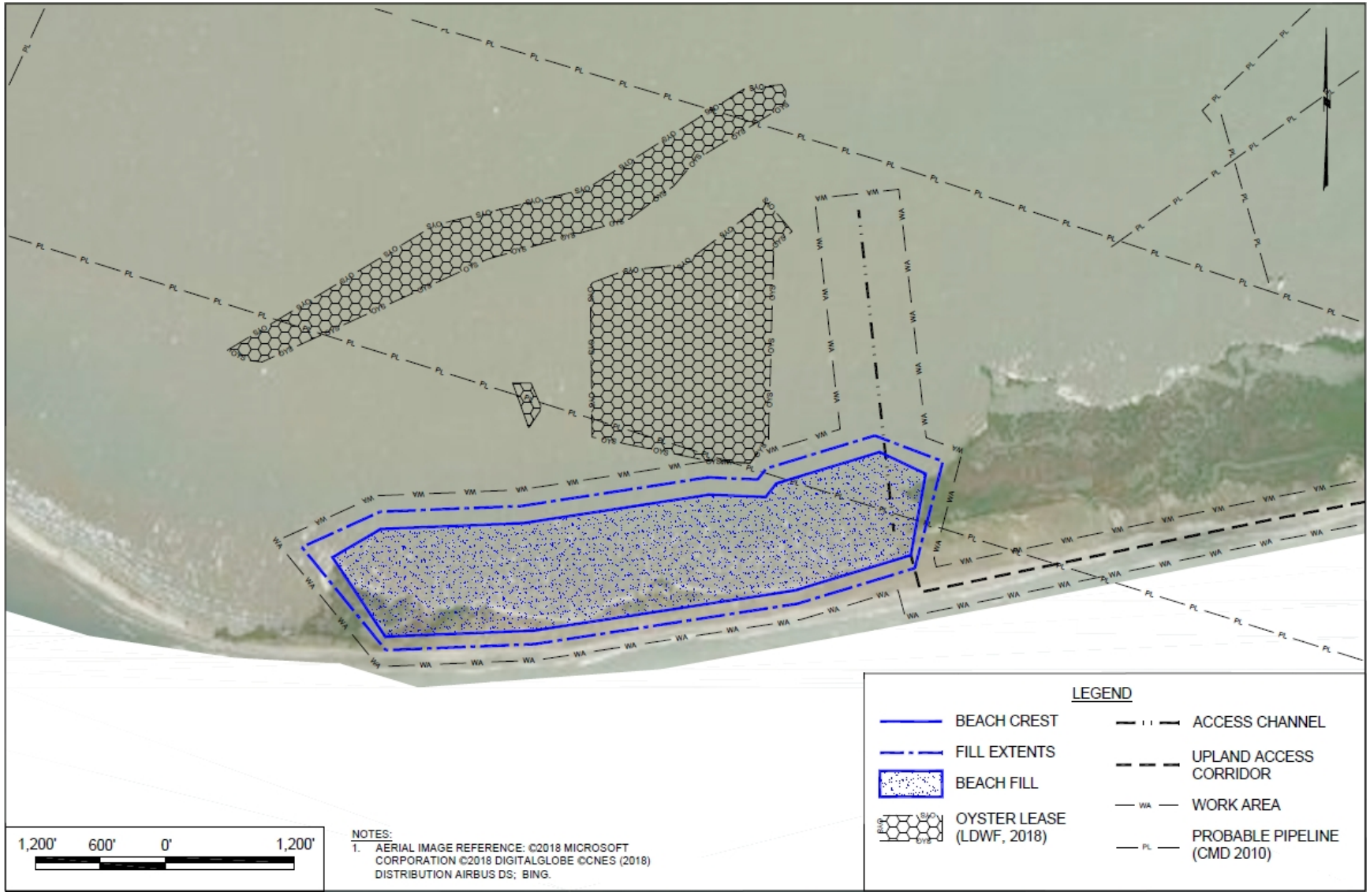

Figure 4-1. Oyster Leases near the Trinity-East Island Restoration Project Features

The No-action Alternative would have no impact on present oyster leases. However, further erosion of the islands and continued breaching may cause overwashed sediment to be deposited on the existing oyster beds as well as increased difficulty in fishing these areas due to increased wave energies. The Design Alternative would have no long-term adverse impact on present conditions and may contribute to long-term viability of oyster beds behind the islands through protection from high gulf energy waves and sediment deposition during overwash events. During construction, precautions will be taken to avoid impact to oyster leases with the installation of turbidity screens, and by requiring the contractor to locate the weir/spill box to prevent sediment from impacting oyster leases during construction and where it will be least likely to impact the oyster leases.

4.3 Coastal Zone Management (CZM)

In order to comply with CZM requirements, the Project will need a Coastal Use Permit (CUP) prior to construction, which is issued by the LDNR. Applications for the CUP and USACE 404 permits have been submitted. A Pre-Application permit meeting between CPRA, LDNR and USACE was held on 4/23/2018. A joint coastal use permit (CUP) application was submitted on April 30, 2018 for the Project. The comment period for the CUP (P20180461) opened on May 24, 2018 and closed on June 18, 2018. The comment period for the USACE Section 404 permit (MVN-2018-0532-CQ) opened on May 18, 2018 and closed on June 11, 2018. The CUP and Section 404 permits are anticipated to be issued by early 2019. The Louisiana Department of Natural Resources Office of Coastal Management determined that the proposed Project is consistent with the approved Louisiana Coastal Resources Program and provided Coastal Zone Consistency in correspondence dated June 27, 2018 (C20180060).

4.4 Hazardous, Toxic and Radioactive Waste (HTRW)

Federal databases at the EPA and state databases at the LDEQ were reviewed to determine the location of any hazardous material sites and to identify any potential hazardous materials sites within the study area. None of the Federal or state databases searched located any potential hazardous materials sites near the Project Area or the borrow area.

As part of the LCA TBBSR Study, a Phase I Environmental Site Assessment (ESA) was conducted to identify historical or overt physical evidence of current or past activities or materials with the Project Area and its immediate vicinity which constitute a “recognized environmental condition (REC)” (USACE, 2010). The Phase I ESA did recommend further investigation of a potential REC on East Timbalier Island but, did not identify a REC on Timbalier or Trinity-East Islands.

4.5 Infrastructure

There is substantial oil and natural gas activity in the area and, especially, behind the islands in Lake Pelto, Terrebonne and Timbalier bays. There are no residential, commercial, or industrial uses on Timbalier or Trinity-East Islands. There are no major port or terminal installations within this unit. Oil and natural gas access canals dredged on the islands have negatively impacted the islands. These canals serve as potential weak spots, or focal points, for breaches to form during severe storm and overwash events. There are no major port or terminal installations or known oil and/or gas wells located within the proposed fill templates on Timbalier or Trinity-East Islands.

The pipeline atlas shows six (6) potential pipeline crossings within the fill template of Timbalier Island and one (1) crossing on the fill template of Trinity-East Island. The pipeline atlas shows nine (9) potential pipeline crossings in the conveyance corridor and pump-out areas between Timbalier Island and the borrow areas. The pipeline atlas shows twelve (12) potential pipeline

crossings in the conveyance corridor and pump-out areas between Trinity-East Island and the borrow areas. Adverse impacts to regional infrastructure are not anticipated with the Project Area. The Project, rather, would enhance the structural integrity of the island allowing the island to continue providing potential storm surge attenuation benefits for infrastructure located north of the islands.

4.6 Non-Issue Environmental Considerations

Other environmental elements that were considered but determined not to be factors in the proposed action included floodplains, prime farmland soils, socioeconomic and environmental justice issues. The Federal Emergency Management Agency Flood Insurance Rate Maps delineate the 100-year Flood Hazard Areas, designated “A” or “V” zones. Coastal zone areas are designated “V” zones in which structures are subject to damage from both flooding and significant wave action. The Terrebonne Basin Barrier Islands are designated to be in a “V” zone area. Coastal barriers are unique landforms that provide protection for diverse aquatic habitats and serve as the mainland’s first line of defense against the impacts of coastal storms and erosion. Implementation of the proposed Project will not result in the construction or introduction of any structure that would impede, displace, retard or cause flood waters to backup. The proposed Project is intended to be located at the weak spots of the islands to enhance the structural integrity of the island.

No residential areas, cultivation or livestock grazing exist within the Project Area. The soils are not considered prime farmland and there is no potential for grazing once the Project construction has been completed. A basic Environmental Justice analysis was not performed.

4.7 Unavoidable Adverse Effects

The primary unavoidable adverse effects are the immediate impacts from construction related to sediment excavation and deposition on the non-mobile benthic organisms in the areas; and, minor and temporary disturbance to adjacent wetlands, water, and air quality. The effects on air, wetlands, and water quality and the noise generated by the proposed Project will be of a temporary nature. Because the Project is a restoration action, the social and environmental benefits of the proposed Project are considerably greater than the environmental impacts and irretrievable commitment of resources identified in this document. The proposed Project will reduce the identified risks of taking No-action and would create beneficial beach, dune, intertidal marsh habitat with dredged material.

4.8 Relationship Between Local, Short-Term Use of the Environment and the Maintenance and Enhancement of Long-Term Beneficial Uses

Trinity-East and Timbalier Islands are rapidly decreasing in size as the shorelines are eroding at rapid rates. All structural and non-structural alternatives have short-term localized impacts during construction but offer significant long-term environmental benefits. No long-term adverse impacts to adjacent islands, wetlands, water quality, threatened or endangered species, species managed by the Gulf of Mexico Fishery Management Council or their essential habitat, other fish and wildlife resources, recreational or socio-economic resources, or cultural resources, are expected.

4.9 Irreversible and Irretrievable Commitment of Resources

Ship Shoal is the largest of a series of inner shelf sand shoals off the Louisiana coast. The use of the sand from South Pelto Lease Blocks 12 and 13 is unlikely to deplete the supply of sand suitable for future restoration projects. There would be sufficient sand remaining in the dredged areas for re-colonization of benthic organisms. Use of the sand from this area is not an

irretrievable commitment of resources. The irreversible and irretrievable commitment of resources would be labor, materials, wear on machinery, monies spent, and energy expended for implementation of the restoration action.

5.0 - PUBLIC PARTCIPATION AND CONSULTATIONS

The public recognizes that the continued loss of coastal wetlands can ultimately result in the displacement of entire communities, the loss of occupational and recreational opportunities, and ultimately, the forfeiture of a unique culture and way of life. Passage of the 2017 Louisiana Comprehensive Master Plan for a Sustainable Coast clearly demonstrated the public's overwhelming support to effectively address the State's coastal land loss problem. The projects outlined in the 2017 Coastal Master Plan has received widespread support from a diverse array of coastal advocates, stakeholders, parish officials and communities.

As part of the LCA TBBSR study, a Notice of Intent (NOI) to prepare a draft Environmental Impact Statement (EIS) was published in the *Federal Register* (volume 73, number 246) on December 22, 2008. The purpose of the NOI was to formally announce the intent to prepare an EIS for the LCA TBBSR study, identified in the 2004 LCA Ecosystem Restoration Plan as a near-term critical project. A public scoping meeting for the LCA TBBSR Study was held on February 10, 2009 in Houma, Louisiana.

The draft EIS for the LCA TBBSR was publicly released in June 2010 for review and comment during a 45-day period. A public meeting soliciting comments on the proposed action was held during this time. Comments from the review were incorporated into the Final EIS, which was released for a 30-day public review in October 2010. The Final EIS, combined with the Integrated Feasibility Study, accompanied a December 30th, 2010 report from the Chief of Engineers to the Secretary of the Army, fulfilling the requirements of WRDA, 2007. On February 11, 2013 the New Orleans District, USACE, the Louisiana Department of Environmental Quality (LDEQ), the LDNR, and the BOEM, New Orleans, issued a Joint Public Notice following receipt of the Coastal Use Permit application from CPRA. The Joint Public Notice initiated the public comment process for the State/Federal CUP, the LDEQ Water Quality Certification, and the Essential Fish Habitat review under the Magnuson-Stevens Fishery Conservation and Management Act (NMFS). In addition, submission of the CUP and the Joint Public Notice, followed by this Environmental Assessment facilitated completion of the USACE Environmental Assessment and Finding of No Significant Impact (FONSI), signed on June 07, 2014. The USACE EA details compliance with the broad range of issues that must be addressed for satisfactory adherence to the National Environmental Policy Act (NEPA), including reviews and consultations by the U.S. Fish and Wildlife Service and NOAA Fisheries for issues associated with threatened and endangered species and migratory birds.

Specific to the permit for this Project, public comments were solicited by the LDNR and USACE in May-June 2018 through the permitting process. Consultation with the FWS, NMFS, and LDWF has been conducted in accordance with the Endangered Species Act of 1973 and Fish and Wildlife Coordination Act. The EA has been prepared in coordination with the NMFS in determining categories of EFH and associated fisheries species within the Project Area. Submittal of the EA is provided to initiate formal Federal consultation requirements pertaining to EFH under the MSFCMA. Federal, State, and local agencies, as well as other interested stakeholders, will receive a copy of this EA.

Specific to the permit for this Project, consultation has been conducted with the Louisiana Department of Culture, Recreation and Tourism in accordance with the National Historic Preservation Act of 1966, and Archaeological and Historic Preservation Act of 1974. Responses from the respective agencies with regard to the proposed action are included in Appendix A.

6.0 - PERMITS AND ENVIRONMENTAL COMMITMENTS

6.1 Permits

The following is a list of permits that are required to implement the proposed Project:

- LDNR Office of Coastal Management - Coastal Use Permit
- USACE Section 10/404 Permit including an independent Environmental Assessment
- LDEQ 401 Water Quality Certification
- LDWF Special Use Permit

All of the requisite permits were obtained in conjunction with the submission of the Joint Coastal Use and Section 10/Section 404 Permit Application that was filed in May 2018. The USACE completed an independent Project-specific EA prior to issuance of the 10/404 permit (MVN-2018-0532-CQ) on April 22, 2019. As part of the review process USACE received comments from LDWF, USFWS, and NOAA Fisheries. The permits and associated documents are included in Appendix A.

6.2 Environmental Impact Statement Documentation

As part of the development of the TBBSR EIS, the USACE and CPRA coordinated with state and federal agencies and received a variety of regulatory consultation documents associated with the NER Plan (USACE, 2010).

6.2.1 Protection of Fish and Wildlife Resources

The CPRA and USACE provided project specific information to the USFWS and NOAA Fisheries. The USFWS issued a concurrent letter for the TE-143 project on February 19, 2019. The USFWS correspondence responding to the USACE Section 10/404 permit public notice is included in Appendix A.

On July 12, 2018, the CPRA and NOAA Fisheries staff met to review the project. Staff from NOAA requested that CPRA provide specific project assessment information. That project specific assessment information was provided to NOAA Fisheries staff on December 18, 2018.

6.2.2 Water Quality

CPRA submitted an application for a Water Quality Certification (WQC) to the LDEQ for the implementation of the TE-143. A WQC letter dated September 11, 2018 stated that the requirements for a Water Quality Certification (WQC180517-03) for permit MVN-2018-0532-CQ had been met and that the placement of fill material would not violate water quality standards in Louisiana in accordance with Section 404(b)(1) of the Clean Water Act. The Water Quality Certification is included in Appendix A.

6.2.3 Coastal Use Permit and Coastal Zone Consistency Determination

In accordance with Section 307 of the Coastal Zone Management Act, the Louisiana Department of Natural Resources (LDNR), Office of Coastal Management (OCM) reviewed the Project for consistency with the approved Louisiana Coastal Program (LCRP). Following receipt of the Coastal Use Permit (CUP) application for the TE-143 Project, OCM issued the Coastal Use Permit/Consistency Determination (P20180461) on December 19, 2018.

6.2.4 Cultural Resources

Archival research, surveys, and consultation with the Louisiana State Historic Preservation Officer (SHPO), was conducted for the Project. All activities have been conducted in accordance with the National Historic Preservation Act, as amended; the Archeological and Historic Preservation Act (AHPA); as amended; and Executive Order 11593. The Project is in full compliance with the NHPA as well as the AHPA and EO 11593. Coordination with the SHPO and the Sovereign Nation of the Chitimacha for the USACE, LDNR and LDEQ permit actions is complete. SHPO concurrence was received on November 19, 2017 for the Phase 1 Cultural Resources Investigation for the Borrow Area (Appendix A). SHPO concurrence for the Phase 1 Cultural Resource Investigation for the conveyance corridors and pump out areas on March 19, 2019. Buffer zones were created around potentially significant resources to avoid accidental disturbance from dredging or dredging-related activities. Buffer zone requirements will be specifically detained in the BOEM Non-Competitive Negotiated Agreement. In summary, no significant cultural resources are located within the APE for the fill template and no significant cultural resources will be affected in the OCS portion of the Project. Therefore, the planned undertaking will have no effect on prehistoric and/or historic properties (36 CCFR Part 800.4(d)(1).

6.2.5 Commitments

The CPRA commits to avoiding, minimizing, or mitigating for adverse effects during construction activities for the Project. The CPRA will comply with the Endangered Species Act requirements elaborated in the consultation documents and permits associated with this Project provided by BOEM, USACE, USFWS, NOAA Fisheries, LDNR, LDEQ, and LDWF. Specific attention will be directed to the requirements of the Section 10/Section 404 and Coastal Use permits and BOEM's OCS Lease. The Project Contract Specifications will address contractor compliance with the maritime Rules of the Road and the U.S. Coast Guard regulations regarding vessel operation and obstruction to navigation.

The CPRA will ensure that all construction activities will be kept under surveillance, management, and control to minimize interference with, disturbance to, and damage to fish and wildlife. The CPRA commits to having a Bird Monitoring and Abatement Plan implemented by the construction contractor during the Project, the contents of which will be developed in consultation with the USFWS and LDWF. The CPRA also commits to surveys and monitoring for the piping plover and red knot including a benthic survey; details of which will be developed in consultation with the USFWS and LDWF. The CPRA also commits that all reasonable and prudent measures stipulated in the BO to protect endangered sea turtles and subsequent guidance from NOAA Fisheries, if a hopper dredge is utilized for construction of the Project features.

The CPRA commits to construction monitoring which will begin with a pre-construction meeting and continue with bi-weekly meetings through the duration of construction. Pre-construction hazard surveys will be conducted to verify and mark the location of hazards prior to construction. Pre- and post-construction and dredging progress bathymetric and topographic surveys will be conducted to monitor the borrow areas, conveyance corridors, pump-out areas and fill areas on Trinity-East and Timbalier Islands. Construction activities will be monitored to ensure that the activities stay within the Project footprint and all activities are completed in accordance with all permit conditions and stipulations. Emphasis will be placed on any identified cultural resource or hazard avoidance buffers within or adjacent to the pump-out areas, conveyance corridors, including pipeline crossings, and in the borrow areas. Upon completion of construction, the CPRA will document construction activities in a construction completion report. Table 6-1 presents the mitigation measures of the preferred alternative.

Table 6-1. Summary of Avoidance, Minimization and Mitigation Measures of Preferred Action

Resource	Potential Avoidance, Minimization and Mitigation Measures
Geology, Topography, and Physical Oceanographic Processes	• Construction of marshes would replace marsh covered during island construction. • Sand fencing and vegetative plantings of disturbed areas would stabilize soil, reduce resuspension of recently deposited sediment, and enhance sedimentation. • Borrow areas would be far enough off shore that no impacts to shorelines are anticipated.
Cultural Resources	• BOEM review of the RCG 2018 cultural resources survey report is in process and may result in additional avoidance recommendations.
Air Quality	• Best management practices will minimize exhaust fumes from entering the air.
Surface Water and Water Column Resources	• Best management practices would prevent or minimize soil erosion. • Compliance with the Clean Water Act and other regulations would protect water resources.
Wetlands	• Best management practices would minimize disturbance of intact wetlands. • Compliance with the Clean Water Act, Section 404 and Section 301, would protect wetlands from unnecessary disturbance.
Vegetation	• Project-specific evaluations and coordination with appropriate federal, state, and local agencies would focus on effective vegetation management. • Best management practices would reduce scour, erosion, and sedimentation. • Habitat restoration would focus on replanting native species.
Aquatic Biota, Fisheries, and Essential Fish Habitat	• Undredged areas adjacent to borrow areas would provide source organisms for recolonization. • Best management practices would minimize turbidity in borrow areas. • Project-specific evaluations and consultation with appropriate federal, state, and local agencies would focus on protecting sensitive species.
Terrestrial Wildlife	• Project-specific evaluations and coordination with appropriate federal, state, and local agencies will focus on protecting sensitive wildlife species.
Threatened, Endangered, and Sensitive Species	• Use of a cutterhead dredge would not likely impact sea turtles. • Use of a hopper dredge in conjunction with mitigations measures such as turtle observers, paint test inspection, and relocation trawling will minimize the potential for collisions with turtles and incidental turtle takes. • Coordination with the U.S. Fish and Wildlife Service, NOAA Protected Resources, and state agencies on state and federally listed species would focus on protecting threatened and endangered species.
Oyster Leases	• During construction, install turbidity screens and requiring the contractor to locate the weir/spill box to prevent sediment from impacting oyster leases during construction and where it will be least likely to impact the oyster leases.

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8.0 - APPENDICES

A Correspondence and Permitting Documents

B Alternatives Analysis Report