COVER

FINAL EIS

USCG FINAL ENVIRONMENTAL IMPACT STATEMENT

ADDRESSING THE

PORT DOLPHIN LLC LIQUEFIED NATURAL GAS DEEPWATER PORT LICENSE APPLICATION

DOT DOCKET NUMBER: USCG-2007-28532

PREPARED BY: engineering-environmental Management, Inc. (e^2M)
for
USCG Deepwater Ports Standards Division (CG-5225)
U.S. Coast Guard Headquarters
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Port Dolphin Energy LLC, proposes to own, construct, and operate a deepwater port, named Port Dolphin, in the Federal waters of the Outer Continental Shelf in lease blocks designated by the Minerals Management Service as St. Petersburg (PB) blocks: PB545, PB546, PB547, PB548, PB504, PB505, PB506, PB507, PB463, and PB589. These blocks are approximately 28 miles off the west coast of Florida to the southwest of Tampa Bay. Port Dolphin would consist of a permanently moored unloading buoy system with two submersible buoys separated by a distance of approximately 3 miles. The buoys would be designed to moor a specialized type of liquefied natural gas vessel called a Shuttle and Regasification Vessel (SRV) of either 145,000 or 217,000 cubic meter capacity. Natural gas would be delivered to shore from Port Dolphin via a proposed new 36-inch-diameter-pipeline, approximately 42 miles in length, that would connect onshore in Manatee County, Florida, with the Gulfstream Natural Gas System, LLC, and Tampa Electric Company (TECO) Bayside pipeline. Initially, Port Dolphin would be capable of a natural gas throughput of 400 million standard cubic feet per day (MMscfd) and would eventually be capable of an average of 800 MMscfd with a peak capacity of 1,200 MMscfd.

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30 Jun 09	Melissa Penner	Deepwater Ports NEPA Specialist
Date	Preparer/Environmental Project Manager	Title/Position
30 Jun 2009	Mark G. Prescott	Chief, Deepwater Ports Standards
Date	Environmental Reviewer	Title/Position

This document has been prepared in support of the Administrator of the Maritime Administration for purposes of issuing a Record of Decision for this deepwater port application license.

30 Jun 2009	Mark G. Prescott	Chief, Office of Operating and Environmental Standards
Date	Responsible Official	Title/Position

FINAL ENVIRONMENTAL IMPACT STATEMENT ADDRESSING THE PORT DOLPHIN LLC DEEPWATER PORT LICENSE APPLICATION

Location: In the Gulf of Mexico, approximately 28 miles off the western coast of Florida, and approximately 42 miles from Port Manatee, Manatee County, Florida.

Docket Number: USCG-2007-28532.

Prepared By: The lead agencies, U.S. Coast Guard (USCG) and the Maritime Administration, and their contractor, engineering-environmental Management, Inc. (e^2M).

Cooperating Agencies: Federal Energy Regulatory Commission; U.S. Environmental Protection Agency; U.S. Department of the Interior, Minerals Management Service and U.S. Fish and Wildlife Service; U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries); U.S. Army Corps of Engineers.

Contact Information: M.A. Prescott (CG-5225), 2100 Second Street, SW, Washington, DC 20593-0001, 202-372-1440.

Abstract: Port Dolphin Energy LLC, proposes to own, construct, and operate a deepwater port, named Port Dolphin, in the Federal waters of the Outer Continental Shelf in lease blocks designated by the Minerals Management Service as St. Petersburg (PB) blocks: PB545, PB546, PB547, PB548, PB504, PB505, PB506, PB507, PB463, and PB589. These blocks are approximately 28 miles off the western coast of Florida to the southwest of Tampa Bay, in a water depth of approximately 100 feet. Port Dolphin would consist of a permanently moored unloading buoy system with two submersible buoys separated by a distance of approximately 3 miles. The buoys would be designed to moor a specialized type of liquefied natural gas (LNG) vessel called a Shuttle and Regasification Vessel (SRV). The Applicant would plan to use two classes of SRVs, either 145,000- or 217,000-cubic-meter capacity. When the SRVs are not present, the buoys would be submerged on a special landing pad on the seabed, 60 to 70 feet below the sea surface. SRVs are equipped to vaporize cryogenic LNG cargo to natural gas through an onboard closed-loop vaporization system, and to meter gas for send-out by means of the unloading buoy to a 36-inch flowline to a Y-intersection, and then to a 36-inch pipeline approximately 42 miles in length that would connect onshore in Manatee County, Florida, with the Gulfstream Natural Gas System, LLC, and Tampa Electric Company (TECO) Bayside pipeline. Only SRVs would call on Port Dolphin. Initially, Port Dolphin would be capable of a natural gas throughput of 400 million standard cubic feet per day (MMscfd) and would eventually be capable of an average of 800 MMscfd with a peak capacity of 1,200 MMscfd. Construction of Port Dolphin would be expected to take 11 months. Port Dolphin deepwater port would be designed, constructed, and operated in accordance with applicable codes and standards and would have an expected operating life of approximately 25 years.

Date of Publication: July 2009

FINAL

ENVIRONMENTAL IMPACT STATEMENT

ADDRESSING THE

PORT DOLPHIN LLC
DEEPWATER PORT LICENSE APPLICATION

Maritime Administrator
United States Maritime Administration
Southeast Federal Center
1200 New Jersey Ave, SE
Washington, DC 20590

and

Commandant
United States Coast Guard
Deepwater Ports Standards Division (CG-5225)
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Docket No. USCG-2007-28532

The Federal Docket Management System
is available at <*http://www.Regulations.gov*>.

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Executive Summary

Introduction

On March 29, 2007, Port Dolphin Energy LLC (also referred to as the Applicant, or as Port Dolphin) submitted to the U.S. Coast Guard (USCG) and Maritime Administration an application under the Deepwater Port Act of 1974 (DWPA)[1] for all Federal authorizations required for a license to own, construct, and operate a deepwater port off the coast of Florida. On June 15, 2007, USCG notified the Applicant that the application contained sufficient information to continue processing, and on June 25, 2007, the USCG and the Maritime Administration issued a Notice of Application in the *Federal Register* summarizing the application[2]. In December 2007, the Applicant filed an amended application that proposed a new pipeline route intended to avoid sensitive biological resource areas (Port Dolphin 2007b). In December 2008 the Applicant filed a second amendment to the application. The second amendment proposed a new pipeline route intended to avoid sand resource areas used for beach replenishment (Port Dolphin 2008d). The Port Dolphin project, referred herein to as the Project, was assigned Docket No. USCG-2007-28532.

The staffs of the USCG and Maritime Administration prepared this Environmental Impact Statement (EIS) to address the potential environmental and socioeconomic impacts associated with the Project. The Maritime Administration is the lead Federal agency responsible for licensing of the deepwater port, which is proposed to consist principally of two unloading buoys for mooring liquefied natural gas (LNG) vessels and a pipeline connecting to two existing onshore natural gas pipelines.

Concurrent with their application for the deepwater port, the Applicant submitted an application to the Federal Energy Regulatory Commission (FERC) for a Certificate of Public Convenience and Necessity (Certificate) under Section 7 of the Natural Gas Act (NGA), as amended, to construct and operate a new natural gas pipeline and ancillary facilities in Florida. FERC is the cooperating Federal agency responsible for the review of the onshore portion of the natural gas pipelines and associated aboveground components. The application was assigned FERC Docket Nos. CP07-191 and -192. FERC issued a Notice of Application in the *Federal Register* for the Proposed Onshore Pipeline on May 9, 2007[3]. After discussions with the Florida Department of Environmental Protection, the Applicant made changes to their onshore pipeline route. Subsequently, the Applicant filed an amended application with the FERC. On January 28, 2008, the FERC issued a new Notice of Amendment for the Proposed Onshore Pipeline which was published in the *Federal Register* on February 4, 2008[4]. The amended application was assigned Docket No. CP07-191-001. FERC also opened an additional scoping period to solicit comments on the proposed revisions to the onshore pipeline route. In January 2009, the Applicant filed a second amendment with FERC that modified details of the construction of the onshore pipeline. The Applicant also filed applications with the U.S. Army Corps of Engineers (USACE) for Department of the Army permits pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 United States Code [U.S.C.] 403) and Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344). The USACE has jurisdiction over the wetlands associated with the Proposed Onshore Pipeline. The Applicant also filed its applications for coverage under the Clean Air Act (CAA) and CWA with the U.S. Environmental Protection Agency (USEPA). This EIS is the supporting document for FERC's certification under the NGA, USACE's permit decisions related to Section 10 of the Rivers and Harbors Act and Section 404 of the CWA, and USEPA's permit decisions and related consultations under the CWA and CAA.

[1] Public Law (P.L.) 93-627, Sec. 3, January 3, 1975, 88 Stat. 2127, as amended, codified to 33 U.S.C. 1501–1524.
[2] 72 FR 121, pp. 34741–2.
[3] 72 FR 94, pp. 27552–3.
[4] 73 FR 23, pp.6497–8.

The DWPA establishes a licensing system for ownership, construction, and operation of deepwater ports in waters beyond the territorial limits of the United States. Originally, the DWPA promoted the construction and operation of deepwater ports as a safe and effective means of importing oil into the United States and transporting oil from the Outer Continental Shelf (OCS), while minimizing tanker traffic and associated risks close to shore. The Maritime Transportation Security Act of 2002 amended the definition of "deepwater port" to include facilities for the importation of natural gas[5].

LNG is natural gas that has been cooled to about minus 260 degrees Fahrenheit (°F) (-162.2 degrees Celsius [°C]) for efficient shipment and storage as a liquid. LNG is more compact than the gaseous equivalent, with a volumetric differential of about 610 to 1. LNG can be transported long distances across oceans using specially designed ships, thus allowing access to stranded reserves of natural gas that cannot be transported by conventional pipelines.

Under the DWPA, all deepwater ports must be licensed by the Secretary of Transportation (Secretary). On June 18, 2003, the Secretary delegated authority to the Maritime Administrator (Administrator) to issue, transfer, amend, or reinstate a license for the construction and operation of a deepwater port[6]. Hereafter, "the Administrator" refers to the Maritime Administrator's actions and responsibilities as the delegated representative of the Secretary. The USCG is preparing the EIS in coordination with the Maritime Administration although USCG is now part of the Department of Homeland Security (DHS)[7]. The DWPA requires a license applicant to submit detailed plans for its facility.

Purpose and Need

The purpose of licensing deepwater ports for importing LNG in the OCS is to provide a reliable and timely supply of natural gas that would increase energy diversity while considering impacts on the environment to serve the growing demand for natural gas for residential, industrial, and electric generation within west-central Florida. This requires construction of appropriate facilities for receiving the LNG, revaporizing the LNG to gaseous state, and interconnecting the facility to the transmission pipelines that can reach appropriate markets within the United States.

The DWPA of 1974, as amended, was passed to promote and regulate the construction and operation of deepwater ports as a safe and effective means of importing oil or natural gas into the United States. The DWPA requires the Administrator to approve, approve with conditions, or deny a deepwater port license application. The Congressional intent expressed in 33 U.S.C. 1501 is as follows:

- "authorize and regulate the location, ownership, construction and operation of deepwater ports in waters beyond the territorial limits of the U.S."
- "provide for the protection of the marine and coastal environment to prevent or minimize any adverse impact that might occur as a consequence of the development of such ports"
- "protect the interests of the U.S. and those of adjacent coastal States in the location, construction, and operation of deepwater ports"

[5] P.L. 107-295, Section 106, November 25, 2002, 116 Stat. 2064.
[6] 68 FR 36496–97.
[7] Title XV (Transition) of the Homeland Security Act provides that "pending matters," including license applications currently being processed, will continue regardless of the transfer of USCG from the U.S. Department of Transportation (USDOT). Even though the function of processing applications has been transferred with USCG to the U.S. Department of Homeland Security, the Secretary of Transportation retains ultimate authority to issue, transfer, amend, or reinstate licenses under the Deepwater Port Act.

- "protect the rights and responsibilities of the States and communities to regulate growth, determine land use, and otherwise protect the environment in accordance with law"
- "promote the construction and operation of deepwater ports as a safe and effective means of importing oil and natural gas into the U.S. and transporting oil and natural gas from the outer continental shelf while minimizing tanker traffic and the risks attendant thereto"
- "promote oil and natural gas production on the outer continental shelf by affording an economic and safe means of transportation of outer continental shelf oil and natural gas to the U.S. mainland."

Part of the intent for establishing the DWPA was to provide a mechanism to meet the nation's existing and estimated demand for energy supplies by increasing access to worldwide sources. The recent DWPA amendments to include LNG facilities indicate that Congress recognizes the potential for LNG imports to become a key energy supply source in the United States over the coming years.

Florida is heavily dependent on natural gas as a source of energy for electricity, home heating, and other uses. Based on future projections, there is a growing demand for additional natural gas in this area; however, this demand cannot be met by the existing domestic supply or by existing natural gas pipelines. The predominant energy concerns expressed in all the energy assessments and plans developed by the State of Florida in recent years relate to energy security, including the need for fuel diversity and fuel supply reliability. These plans identify the increasing dependency of Florida's electrical-generating utilities on natural gas (particularly given the volatility in its availability and price) and stress the need to return to the practice of balanced fuel supply. However, opposition to coal-fired generation and the long lead time needed to implement a balanced fuel supply will still result in increases in natural gas consumption by utilities. Moreover, the state is extremely dependent on natural gas supplies originating from the Gulf of Mexico (GOM), which is mainly transported via two natural gas pipelines. The potential for future disruptions of Florida's economy resulting from hurricane-inflicted damage to either gas field infrastructure or the pipelines is significant. By expanding Florida's natural gas infrastructure, an LNG deepwater port also would provide the state's natural gas markets with fuel supply diversity through global sourcing of LNG. The Port Dolphin project would provide a source of natural gas to western Florida that is independent of both GOM supply disruptions and of the pipeline constraints of the existing interstate pipelines.

Scope and Organization of the EIS

This EIS assesses potential environmental impacts associated with the installation, operation, and decommissioning of the Port. The affected environmental components encompassed by this EIS include water resources, biological resources, cultural resources, geological resources, marine areas and land use, recreation and aesthetics, air quality, noise, socioeconomic resources and environmental justice, and navigation and transportation. The EIS describes the Project and potential alternatives (**Section 2**), the affected environment as it currently exists (**Section 3**), the probable environmental consequences that might result from installation and operation of Port Dolphin (**Section 4**), public safety (**Section 5**), and cumulative and other impacts (**Section 6**). **Section 7** covers greenhouse gas emissions from the project. A list of preparers and references used in preparing the document are provided in **Sections 8** and **9**, respectively. Volume II and Volume III contain the appendices, including public comments, records of coordination with Federal and state agencies, applicable laws and executive orders (EOs), detailed maps, and specific biological information.

Public Review and Comment

Agency and public participation in the National Environmental Policy Act (NEPA) process promotes open communication between the public and the government and enhances decisionmaking. All persons and organizations having a potential interest in the Administrator's decision whether to grant the License are encouraged to participate in the decisionmaking process.

The USCG and the Maritime Administration initiated the public scoping process on July 12, 2007, with the publication of a Notice of Intent (NOI) to prepare an EIS in the *Federal Register*. The NOI included information on public meetings and informational open houses; requested public comments on the scope of the EIS; and provided information on how the public could submit comments by mail, hand delivery, facsimile, or electronic means[8]. Documents and comments for this project can be found at http://www.regulations.gov. Users can type in the complete docket number, USCG-2007-28532, and view all related documents, and submit a comment.

An Interested Party Letter, the NOI published in the *Federal Register*, and a fact sheet describing the Project were sent to approximately 190 Federal, state, and local agency representatives, and other potentially interested parties (see **Appendix A**). As a result of the Applicant's amended application (assigned FERC Docket No. CP07-191-001), the FERC issued a Notice of Limited Scoping for the proposed Port Dolphin project and Request for Comments on Environmental Issues, which was published in the *Federal Register* on February 11, 2008. The Notice indicated that FERC was soliciting input from the public and interested parties and such input would be limited to the proposed onshore pipeline and related facilities (i.e., those under FERC jurisdiction) in Manatee County, Florida. The comment period for scoping closed on March 5, 2008. Public comments submitted as part of the scoping process (see **Appendix A**) were considered during the development of this EIS.

A Notice of Availability for the Draft EIS was published in the *Federal Register* on April 18, 2008. The Draft EIS was uploaded to the Port Dolphin Docket, and more than 200 copies of the Draft EIS were sent to agencies, organizations, and individuals that had expressed interest in reviewing it. An Open House and Public Meeting was held at the Manatee County Convention Center on May 6, 2008, to provide a forum for the public and agencies to obtain information and to provide scoping. The meeting was advertised in the *Tampa Tribune* and the *Bradenton Herald*. The Public Meeting was attended by 41 individuals. Comments on the Draft EIS were accepted through June 2, 2008. Two written comments were provided during the Public Meeting. Seven individuals spoke at the Public Meeting and provided oral comments. A total of 32 comments were received on the USCG Port Dolphin Docket (see **Appendix B**). In total, 34 comments were received during the public review period. All comments on the Draft EIS were considered during the preparation of the Final EIS. **Appendix B** of the EIS includes all materials, including the NOA and other outreach tools used, and all comments on the Draft EIS that were received during the public review period.

Description of the Proposed Action

The Applicant proposes to construct, own, and operate a deepwater port for importation of LNG and send-out of natural gas. Port Dolphin (the Port) would be located approximately 45 kilometers (km) (28 miles [mi]) offshore from Tampa, Florida. The Port would be located in areas designated by the U.S. Department of the Interior (DOI) Minerals Management Service (MMS) as St. Petersburg (PB) blocks: PB545, PB546, PB547, PB548, PB504, PB505, PB506, PB507, PB463, and PB589. The Port would be capable of mooring two LNG carriers (LNGCs), referred to as shuttle and regasification vessels (SRVs), by means of a submerged unloading buoy system. Each of two unloading buoys, also known as

[8] 70 FR 61151–52.

submerged turret loading (STL) buoys, would have eight mooring lines connected to eight pile-driven anchor points in the seafloor. An SRV would typically moor at the deepwater Port for 4 to 8 days. When not connected to an SRV, the STL buoy would be submerged approximately 18.3 to 21.3 meters (m) (60 to 70 feet) below the sea surface and be supported by mooring lines and rest on the STL buoy landing pad. A marker buoy and retrieval line would be used to locate and recover the buoy as an SRV arrives at the deepwater Port. The unloading buoy would be retrieved from its submerged position and hoisted in through a moon-pool in the forward part of the SRV where it would be positioned in a receiving cone within the hull trunk. After the buoy is locked in position, unloading of LNG would begin.

The SRVs proposed for use by the Port would be equipped to transport, store, vaporize, and meter natural gas. A closed-loop, glycol/water-brine heat transfer system would be used to vaporize the LNG. The deepwater port would have an average throughput capacity of 800 million standard cubic feet per day (MMscfd) and a peak capacity of approximately 1,200 MMscfd. Natural gas flowlines from the Port would connect to a 36-inch gas transmission line. The transmission line would interconnect with the existing Gulfstream Pipeline interstate natural gas transmission line and the Tampa Electric Company (TECO) system approximately 73.9 km (46 mi) east of the deepwater port through onshore interconnections. Construction of the deepwater Port components would be expected to take 11 months, with operations planned to commence in the second quarter of 2011. A detailed description of the Applicant's proposal is included in **Section 2.3** of the Final EIS.

Alternatives

The DWPA requires the Secretary to approve, approve with conditions, or deny a deepwater port license application. Consistent with NEPA, in determining the provisions of the license, the Secretary must also consider alternative means to construct and operate a deepwater port. Alternatives for a natural gas deepwater port can extend to matters such as its specific location, methods of construction, and technologies for regasifying LNG. Considering alternatives helps to ensure that decisions concerning the license are well-founded as required by the DWPA and are in the national interest and consistent with national security and other national policy goals and objectives.

Screening was conducted in several steps. First, the conceptual design of the deepwater Port was considered and two designs were selected for evaluation. They are an STL buoy system with special purpose SRV and a Floating, Storage and Regasification Unit (FSRU). Because of environmental and feasibility issues, gravity-based structures, artificial islands, and fixed and floating platform designs were eliminated from further review. A three-phase assessment was then conducted to narrow the potential alternative sites. After site alternatives were identified, alternate routes for the pipelines necessary to interconnect with the existing natural gas transmission structure were evaluated. Finally, specific technology choices, such as vaporization technology, anchoring methods, and construction methods, were evaluated.

Upon application of the screening criteria, alternatives that were eliminated from detailed consideration included Port design concepts, some regasification technologies, design features, and construction methods. Alternatives evaluated in detail in this EIS are the STL and FSRU port concept, two vaporization technologies, two alternatives for siting of the Port in MMS Lease Blocks PB564 and PB190, three natural gas pipeline route alternatives (i.e., a Proposed Site and Route, a Southern Site and Route, and the Offshore Interconnection with Gulfstream Pipeline), and the No Action Alternative.

Proposed Action and Alternative Environmental Impacts

Potential environmental impacts are summarized in the following text by resource area. The impacts described would be essentially the same for both location alternatives, but the Southern Site and Route

alternative would result in more impacts due to the larger footprint, and the Offshore Interconnection with the Gulfstream Pipeline would result in less impacts due to the smaller footprint and avoidance of nearshore areas. **Table ES-1** compares the differences between the two location alternatives and three route alternatives.

Water Quality. A combination of long- and short-term, minor, adverse impacts on water quality would be expected. These would occur with respect to both marine and coastal waters.

Short-term, direct, minor, adverse impacts would include resuspension of sediments that would occur during installation of the Port structures and pipelines, particularly for the pipeline sections closer to Lower Tampa Bay where sediments are finer and would remain suspended for a longer period of time. Onshore pipeline installation, including both trenching and burial and horizontal directional drilling (HDD) methods, would likely encounter groundwater, resulting in a short-term modification of the groundwater flow regime. Construction activities would also be expected to cross some surface waterbodies and wetlands during pipeline installation, but HDD technology would minimize adverse impacts on water quality in these areas. During operations, cooling and bilge water discharges would have several impacts on water quality near the Port, including increased water temperature, increased turbidity, and decreased dissolved oxygen content. Spills of hazardous substances, such as hydrocarbons (e.g., petroleum, oils, and lubricants), might result in short-term, minor, adverse impacts on water quality.

Biological Resources. Minor to moderate, short-term, adverse impacts and minor, long-term, adverse impacts on biological resources could occur as a result of the Project. Onshore activities would have short-term, minor impacts on vegetation and wildlife. Short-term, minor impacts on freshwater wetlands could occur from onshore activities. Permanent minor impacts on forested wetlands would occur, but only a small portion of the impacted wetlands are forested. Brazilian pepper, a nonnative, exotic species, is the dominate species found in forested wetlands along the pipeline route. Permanent minor impacts would also occur to the extractive pond open-water habitats. A permanent levee would be constructed to isolate the area where the proposed pipeline would be placed and the water in the proposed right-of-way (ROW) would be pumped out. Therefore, the pipeline would be placed under hard ground, and the water in the ponds would not be restored in these areas. The ponds currently have little to no vegetation and were formed during mining and other extractive activities. Therefore, impacts on these ponds would be minor.

Short-term, moderate to major, adverse impacts on marine mammals and sea turtles would be due to construction noise. The highest noise intensities would be produced during the installation of the buoy anchors and from HDD operations. The highest operational noise would be from operation of the SRV thrusters during docking at the buoys.

Minor to moderate, short-term and long-term, adverse impacts on benthic communities would occur during the installation of the Port and offshore pipelines. Port and pipeline installation would result in the short-term impacts on approximately 234 acres of benthic habitat and long-term operational impacts on 22.09 acres from seabed sweep from the anchor lines. Approximately 3,000 acres of hard-bottom habitat could be disturbed by pipeline construction. The disturbance could result from anchor cable sweep from the vessels used to plow and lay the pipeline and place armoring mattresses over the pipeline in areas where the pipeline cannot be buried. Proper use of best management practices (BMPs) such as use of midline buoys on anchor cables and design of an anchor placement plan to minimize hard-bottom impacts would reduce the extent of hard-bottom impacts. Recovery of the benthic communities from construction impacts is difficult to predict. Soft-bottom communities would recover before hard-bottom communities. Concrete mattresses would likely be colonized by different communities than what was initially present. Communities impacted during operations by anchor sweep at the 22 acres (16 acres of soft-bottom and 6 acres of hard-bottom) of the Port site would not recover.

Table ES-1. Comparison of Location and Pipeline Alternatives for Port Dolphin

Project Component	Proposed Site and Pipeline Alternative	Southern Site and Pipeline Alternative	Offshore Interconnection with Gulfstream Pipeline
Port Components			
Port C/O footprint	22 acres	30 acres (+36%)	22 acres
Pipeline Components			
Total pipeline length	74.0 km (46 mi)	80.4 km (50 mi) (+9%)	28.8 km (18 mi) (-38%)
Offshore length (from the piggable Y to the bulkhead)	67.6 km (42 mi)	74 km (46 mi) (+9.5%)	N/A
Offshore pipeline construction footprint (3,000-foot construction survey corridor)	16,728 acres	18,180 acres (+ 8%)	6,545 acres (-39%)
Offshore Gulfstream Pipeline crossing	Crosses two times. HDD 1=1,335 feet, HDD 2=2,947 feet	none	N/A
Permitted Sand Borrow Area	0 cubic yards	2,237,225 cubic yards	0 cubic yards
Potential Sand Borrow Areas	48,370,164 cubic yards	63,621,485 cubic yards	0 cubic yards
Offshore shipping channel crossings	none	none	none
Nearshore Terra Ceia crossing	none	Crosses two times. 4.8 km (3.0 mi), and 1.1 km (0.7 mi)	none
Onshore pipeline length	6.4 km (4 mi)	6.4 km (4 mi)	6.4 km (4 mi)
Onshore pipeline C footprint (100-foot ROW)	48.5 acres	48.5 acres	48.5 acres
Onshore O footprint (30-foot ROW)	14.5 acres	14.5 acres	14.5 acres
Onshore wetland crossings C impacts	10.71 acres	10.71 acres	10.71 acres
Onshore wetland crossings O impacts	1.19 acres	1.19 acres	1.19 acres
Onshore Facility and Workspace Components			
Onshore landfall location	Just east of Gulfstream station at Port Manatee	Just east of Gulfstream station at Port Manatee	Just east of Gulfstream station at Port Manatee

Project Component	Proposed Site and Pipeline Alternative	Southern Site and Pipeline Alternative	Offshore Interconnection with Gulfstream Pipeline
Onshore Facility and Workspace Components (continued)			
Aboveground facilities	Interconnection with GS and TECO – 120 x 1,319 feet (3.4 acres) Valve station located on Port Manatee property – 50 x 60 feet (0.07 acres)	Interconnection with GS and TECO – 120 x 1,319 feet (3.4 acres) Valve station located on Port Manatee property – 50 x 60 feet (0.07 acres)	Interconnection with GS and TECO – 120 x 1,319 feet (3.4 acres) Valve station located on Port Manatee property – 50 x 60 feet (0.07 acres)
Onshore extra work spaces (located at the entrance and exit areas for HDD and boring activities)	6 acres	6 acres	6 acres
Staging areas, pipeyard, and contractor facilities would be located on Port Manatee (6 months)	34 acres; includes a concrete batch plant, mattress facility and pipe lay-down areas	34 acres; includes a concrete batch plant, mattress facility, and pipe lay-down areas	34 acres; includes a concrete batch plant, mattress facility, and pipe lay-down areas
Onshore access roads	None (use existing roadways)	None (use existing roadways)	None (use existing roadways)

Notes:
C – Construction; O – Operation
Length and acreage have been rounded to nearest whole number for NEPA planning purposes.

The closed-loop SRVs would adversely impact plankton. The SRVs would require cooling water for the generators that provide power for the vaporization system pumps and blowers, and for hotel loads for normal ship's functions. Prior to submission of the application for this Project, the USCG cooperatively developed an assessment methodology with National Oceanic and Atmospheric Administration's National Marine Fisheries Services (NMFS) to estimate the potential impacts on fisheries resources from entrainment within an open-loop vaporization system. During the development of this EIS and other similar projects in the GOM, USCG and NMFS agreed that evaluation of four species of finfish would represent all of the species that are likely to be present in the Project area. In comments on the assessments for the projects that had proposed open-loop vaporization systems, NMFS stated their preference for closed-loop vaporization systems, such as the one proposed by the Applicant. The primary mitigation identified by NMFS for open-loop systems was substitution of a closed-loop system. However, in evaluations for subsequent deepwater port projects that proposed closed-loop vaporization systems, an analysis of the potential impacts using the quantitative methodology was still conducted.

Based on discussions with NMFS and the Florida Fish and Wildlife Conservation Commission (FWC), two additional species were identified for analysis based on the Port location off the coast of Western Florida. Gag grouper (*Mycteroperca microlepis*) was selected as a commercially and recreationally important species in the Project area that is managed under a Federal Fishery Management Plan (FMP). Sheepshead (*Archosargus probatocephalus*) was selected as a species of concern to Florida that is not managed under a Federal FMP. Potential impacts on Spanish sardine (*Sardinella aurita*) were also assessed because of high densities in the Project area. Spanish sardines are an important forage species for many commercially and recreationally important fish in the eastern Gulf of Mexico. Other species

might have EFH in the Project area or occur in the Project area, but these representative species were selected (in cooperation with NMFS) based on economic and ecological importance, availability of life history data, and the similarity to other population types. It is assumed that impacts on other species in the Project area would be similar to impacts on these representative species. An assessment was also done for the FSRU alternatives using an ambient air vaporization (AAV) system. Since both the FSRU and the LNGCs servicing the Port would require engine cooling water, seawater intake for this alternative would be approximately 4.8 times the intake for STL/SRV alternative.

The assessment to fisheries resources indicates that closed-loop vaporization systems would have direct, adverse, minor impacts on biological resources from the impingement or entrainment of marine organisms. When the equivalent yield was compared to the average landings in Florida, the maximum impact on any species (gag grouper) was found to be 0.03 percent. Impacts for the FSRU/AAV alternative would be equivalent to 0.14 percent of the annual average landings in Florida.

Other minor adverse impacts on biological resources that could occur as a result of the operation of the Port include those associated with increases in vessel traffic, noise, marine debris, and port lighting. Increases in vessel traffic could increase the potential for collisions with marine mammals, thereby increasing the occurrence of serious injuries or mortality. Any marine mammal strike would be considered a "take" under the Marine Mammal Protection Act (MMPA). If a threatened or endangered marine mammal were to be struck, it would also be considered a "take" under the Endangered Species Act (ESA). The U.S. Fish and Wildlife Service (USFWS) has consistently upheld that the take of a single Florida manatee would jeopardize the continued existence of the species, and vessel collisions have been identified as a major source of mortality for this species. While it is known that an increase in vessel traffic increases the risk of collision, the probability of that risk cannot be quantified. The proposed pipeline route does not impact any manatee protected areas or designated habitat. Implementation of proposed BMPs, would reduce the possibility of impacts.

Cultural Resources. Offshore construction (e.g., buoy emplacement, flowline and pipeline burial, and barge anchoring) has the potential for direct and indirect adverse impacts on currently unknown properties potentially eligible for listing in the National Register of Historic Places (NRHP). The proposed Port site and pipeline route avoids known cultural resources. The Applicant has developed an unanticipated discoveries plan to protect any cultural resources discovered during construction of the Port and pipeline.

Geological Resources. Minor, direct, adverse impacts from Port and offshore pipeline installation would be expected. Impacts would be localized and short-term. Subsea sediments are the primary geological resource that would be affected by the Project. The Applicant revised the Proposed Pipeline Route to avoid a permitted sand borrow area and minimize the impacts on other mapped potential sand resource areas. Pipeline construction through permitted or potential sand resource areas would impact less than 1 percent of the potential available sand in each of the identified areas. Approximately 50 acres onshore would be temporarily impacted by construction activities in the pipeline ROW. HDD techniques would disturb natural geologic resources where they are employed, but impacts would be limited to the HDD entry and exit locations. No prime farmland would be impacted.

Marine Areas and Land Use. Minor to moderate, direct, adverse, short-term impacts on marine areas are expected from construction of the Port and offshore pipelines. Minor, long-term impacts on commercial fishing, recreational fishing, and boating could occur within the Safety Zone that would be established around the Port. This zone would limit usage of a very small percentage of the GOM for the life of the Port. The proposed Port and pipeline routes would avoid shipping fairways and navigation channels. The onshore pipeline would restrict future construction along the ROW. No direct or indirect, long-term, adverse impacts would be expected from pipeline operations offshore or onshore.

Recreation and Aesthetics. Short- and long-term, minor, adverse impacts on recreational fishing, boating, and other water-dependent uses would result from construction and operation of the Port. Offshore construction of the Port would be visible to recreational boaters, residents, and visitors. The SRVs in transit and when moored to the buoys would be consistent with other marine traffic in the area. Long-term minor impacts on recreational fisheries could result from the limits placed on boaters in the vicinity of the Port. Operation of the Port and associated onshore facilities could have minor, short-term, adverse impacts on local recreational infrastructure. It is anticipated that the affected resources would adapt to prevent any long-term adverse impacts.

Air Quality. Short-term, direct, minor, adverse impacts on air quality would be expected. Construction equipment onshore and offshore would be the primary source of emissions during construction of the Port (e.g., Port installation, pipeline installation, mobile sources, and pipeline testing). Impacts that exceed Federal and state air quality standards would exist for onshore construction activities but the exceedances would be of very short duration and limited to the area immediately surrounding the construction site. Emissions from Port operations, including SRV emissions, would have a long-term, direct, minor, adverse impact on air quality during the life of the Project. The Port would be within 300 km (186 mi) of two Class I areas, the Chassahowitzka National Wildlife Refuge (NWR), at a distance of 150 km (93 mi) and Everglades National Park (NP) at 244 km (152 mi). Impacts on Class I areas would be below Federal Land Management (FLM) guidelines for Class I areas. Predicted criteria pollutant impacts from operations do not exceed USEPA-established significant impact levels. Pipeline maintenance activities would have a minor, direct, adverse impact on air quality.

Noise. Short- and long-term, minor, adverse impacts on the airborne noise environment would occur from Port operations, vessel traffic, and construction activities. Activities that would produce the greatest amount of noise are short-term actions such as mooring buoy anchor installation, pipe-laying, and construction vessel traffic. Noise generated by the Port operations would not affect noise-sensitive receptors onshore due to the distance from the shore. Support vessels would have the potential to affect noise-sensitive receptors onshore. Noise associated with decommissioning of the facility could have short-term, minor, adverse impacts on local ambient airborne noise. Underwater noise impacts would be short-term, minor to major, and adverse. Construction activities that would produce the greatest amount of noise are short-term actions such as mooring buoy anchor installation. The noise produced by driving the anchor piles could result in major impacts on marine resources, but proper use of BMPs and mitigation measures would be designed to limit impacts. Port operations might produce a slight increase in underwater noise from vessel traffic. The use of thrusters by the SRVs during maneuvers to dock at the Port would result in short-term, minor to moderate, adverse impacts on marine resources. Noise impacts on marine mammals are discussed in the Biological Resources discussion.

Socioeconomics. Construction and operation of the Port would have minor, beneficial impacts on socioeconomic resources through increased employment and purchase of goods and services. The onshore fabrication and support-based operations would be conducted at available existing facilities on Port Manatee and would require no new land or displacement of existing land use. Construction of the offshore flowline and pipeline might have a minor, adverse impact on low-income populations if pipeline construction impacted local commercial or recreational fishing. Project impacts related to population, employment, housing, public services, vessel traffic, and shipping would be minor and easily absorbed within the existing Tampa Bay regional resources and socioeconomic infrastructure. Commercial fishing would be temporarily excluded from the vicinity of construction activities for approximately 11 months during construction. The Port would cause permanent loss of approximately 66 acres of benthic substrata. The benthic substrata impacted by the Port are typical for the area and are not protected or unique. Impacts on shellfish would be minor because the proposed facilities do not traverse any known commercial shellfish beds. Impacts on sand resources for beach sand replenishment programs from establishing a buffer zone around the pipeline are expected to be long-term, minor, and adverse.

Additional mapped sand resources exist in the immediate area and the proposed pipeline route would not impact the permitted sand borrow area.

The potential exists for impacts on biological resources from closed-loop vaporization to indirectly affect commercial and recreational fisheries. These potential adverse impacts would occur as long as the Port was operating. In an attempt to quantify the potential impacts, loss of fish was compared to commercial and recreational fishing activities. No major reduction in populations of the commercially and recreationally important species available to the fishing industries is anticipated. Therefore, measurable secondary economic impacts, such as reduced employment in fishing or fishing-related industries, also are not anticipated. Impacts on other fish species are expected to be of a similar magnitude.

Navigation and Transportation. Minor to moderate, short-term, adverse impacts on transportation resources would be expected from construction of the proposed Port and pipeline which would result in impacts from both construction and operational activities. Approximately 1,800 trips to and from shore are anticipated during the 11-month construction period. Port operations would have a minor, adverse, long-term impact on transportation resulting from two supply trips and one daily crew trip per SRV moored at Port Dolphin. Operational activities are anticipated to be approximately 928 trips annually.

Safety. While safety concerns might have minor, long-term, adverse or beneficial impacts on the decisionmaking processes of potential future proposals within the hazard area, there is no direct, short-term or long-term, adverse impact on activities outside the Safety Zone or Area to be Avoided (ATBA). Mitigation measures would be developed to effectively mitigate anticipated hazards to the general public, non-Port structures, and vessels associated with the Port. An Independent Risk Assessment for the Project estimated the maximum thermal radiation distance to be 4,680 m (2.9 mi). Since the Port locations are at least 28 miles from the nearest shoreline, the potential for direct impacts is minor.

Greenhouse Gas Emissions. An increase of greenhouse gas (GHG) emissions from anthropogenic (man-made) sources since the beginning of industrialization has been shown to correlate with an increase in global average temperature. This has led to concerns that the global climate is changing. The concern is that higher levels of GHGs in the atmosphere and the resultant increase in trapped heat results in the phenomenon of global warming. Since natural gas is a fossil fuel, combustion of natural gas contributes to the generation of greenhouse gasses. The Project would import a daily average of 800 MMscfd of natural gas or less than .0004 percent of U.S. consumption in 2005 and 18.6 percent of current Florida natural gas consumption. Estimated national emissions of GHG for the United States in 2004 were 7,133.5 million metric tons carbon dioxide (CO_2) equivalent. Approximately 83.5 percent of these emissions represent CO_2 emissions from combustion of fossil fuels. Estimated emissions of CO_2 from the State of Florida for 2004 were 258 million metric tons, while national emissions for the United States were 5,957 million metric tons. Therefore, the expected GHG emissions from operation of the Port, 0.9 million metric tons of CO_2 equivalent , represent less than 1 percent of the existing GHG for Florida and less than .000126 percent of the existing GHG for the United States.

No Action Alternative

The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the Applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Mitigation and Best Management Practices

The DWPA requires that an Applicant demonstrate that a proposed deepwater port would be constructed and operated using the best available technology, thereby preventing or minimizing adverse impacts on the marine and terrestrial environment. In addition, the Applicant would be required to follow any BMPs, mitigation measures, and recommendations put forth by Federal and state agencies to reduce adverse impacts on the marine and terrestrial environment. No mitigation measures have been identified for recreational resources and transportation.

Additional mitigations are expected to be developed during the approval process of the Port Operations Manual. The license would require the Applicant to comply with all environmental mitigations, standards, and limitations set forth in the environmental permits issued by the regulatory agencies.

Water Resources. The Applicant submitted a National Pollutant Discharge Elimination System (NPDES) permit application for all of the regulated discharges anticipated in association with operations of the Port. This permit is required under conditions of the CWA. If granted, the permit would describe the conditions and mitigation measures required for compliance.

Biological Resources. To minimize potential impacts on protected species such as marine mammals and sea turtles, the following are expected to be conditions of the License, if issued: MMS/NMFS's *Vessel Strike Avoidance and Injured/Dead Species Reporting* would be included in the Port Operations Manual, a waste management plan would be included in the Port Operations Manual, training on the elimination of marine debris for all offshore personnel, monitoring of impacts of the seawater intake on sea turtle prey, and a plan to use ramp-up procedures and mufflers to minimize the impacts of the noise associated with pile driving and vessel thrusters. If the License is approved, specific mitigation measures to minimize impacts on EFH and commercial and recreational fish and lobster stocks would be incorporated into the design and operation of the Port. A condition of any license granted would include an environmental monitoring program developed in consultation with NMFS to include preconstruction/baseline monitoring and operational monitoring aimed at identifying potential impacts and developing procedures to minimize impacts.

Cultural Resources. Avoidance of the identified sites and unidentified anomalies, and adherence to unanticipated discovery procedures and avoidance measures would ensure no adverse impacts on archeological or historical resources.

Geological Resources. Any significant geological hazard encountered during construction of the Port would be avoided. Additional pre-construction hazard surveys would be conducted prior to construction activities.

Air Quality. The SRVs would use only vaporized LNG as fuel for the diesel engines that provide power to the SRVs while they are moored to the buoys. The SRVs would have selective catalytic reduction (SCR) installed on the exhaust stack of the auxiliary boiler that would be used to provide thermal energy for vaporizing the LNG and on the dual-fuel diesel engines used for power generation while the SRVs are moored to the buoys. This significantly reduces the emissions of nitrogen oxide (NO_x). Oxidation catalysts would also be used to reduce the emissions of carbon monoxide (CO) and volatile organic compounds (VOCs). The Applicant would also be required to obtain all applicable and appropriate air quality permits. The License would require all monitoring and compliance requirements associated with the Port's air permits to be met during the operating life of the facility.

Noise. To minimize noise impacts on marine mammals associated with pile driving and other construction activities, machinery would be operated only when necessary and with the use of noise enclosures or mufflers. Port construction and operation would have minor impacts on shore-based receptors. If full pipeline burial depth cannot be achieved, concrete mattresses will be used. No blasting is anticipated.

Socioeconomics. The need for mitigation of socioeconomic impacts for potential losses of commercial and recreational fisheries is not anticipated. The areas that would be affected by the offshore construction, including all areas for the offshore Port and the pipeline route, including all the Safety Zone and pipeline construction buffer areas, would involve only 26.1 of the approximately 400 square miles of Tampa Bay, for a total of 2.6 percent of the area used by commercial fishermen.

FERC Staff Recommendations

If the FERC Commission authorizes the onshore pipeline portion of the Port Dolphin project, the FERC staff recommends that the following measures be included as specific conditions in the Commission's Order (Order). The FERC staff believes that these measures would further mitigate the environmental impacts associated with the construction and operation of the proposed Project. Mitigation measures 1 through 9 that follow are standard conditions typically recommended by the FERC staff for pipeline projects. FERC staff recommendations 10 through 13 are project-specific.

1. Port Dolphin shall follow the construction procedures and mitigation measures described in its application and supplements (including responses to data requests) and as identified in the EIS, unless modified by the Order. Port Dolphin must do the following:
    a. Request any modification to these procedures, measures, or conditions in a filing with the Secretary of the Commission (Secretary).
    b. Justify each modification relative to site-specific conditions.
    c. Explain how that modification provides an equal or greater level of environmental protection than the original measure.
    d. Receive approval in writing from the FERC Director of the Office of Energy Projects (OEP) before using that modification.
2. The Director of OEP has delegated authority to take whatever steps are necessary to ensure the protection of all environmental resources during construction and operation of the project. This authority shall allow the following:

a. The modification of conditions of the Order.

b. The design and implementation of any additional measures deemed necessary (including stop work authority) to ensure continued compliance with the intent of the environmental conditions, as well as the avoidance or mitigation of adverse environmental impacts resulting from project construction and operation.

3. Prior to any construction, Port Dolphin shall file an affirmative statement with the Secretary, certified by a senior company official, that all company personnel, environmental inspectors (EIs), and contractor personnel will be informed of the EI's authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs before becoming involved with construction and restoration activities.

4. The authorized facility locations shall be as shown in the EIS and as supplemented by filed alignment sheets. **As soon as they are available, and before the start of construction**, Port Dolphin shall file with the Secretary any revised detailed survey alignment maps/sheets at a scale not smaller than 1:6,000 with station positions for all facilities approved by the Order. All requests for modifications of environmental conditions of the Order or site-specific clearances must be written and must reference locations designated on these alignment maps/sheets.

   Port Dolphin's exercise of eminent domain authority granted under NGA Section 7(h) in any condemnation proceedings related to the Order must be consistent with these authorized facilities and locations. Port Dolphin's right of eminent domain granted under NGA section 7(h) does not authorize it to increase the size of its natural gas pipeline to accommodate future needs or to acquire a ROW for a pipeline to transport a commodity other than natural gas.

5. Port Dolphin shall file with the Secretary detailed alignment maps/sheets and aerial photographs at a scale not smaller than 1:6,000 identifying all route realignments or facility relocations, and staging areas, pipe storage yards, and other areas that would be used or disturbed and have not been previously identified in filings with the Secretary. Approval for each of these areas must be explicitly requested in writing. For each area, the request must include a description of the existing land use/cover type, and documentation of landowner approval, whether any cultural resources or federally listed threatened or endangered species would be affected, and whether any other environmentally sensitive areas are within or abutting the area. All areas shall be clearly identified on the maps, sheets, and aerial photographs. Each area must be approved in writing by the Director of OEP **before construction in or near that area**.

   This requirement does not apply to extra workspace allowed by the *Upland Erosion Control, Revegetation, and Maintenance Plan,* minor field realignments per landowner needs, and requirements which do not affect other landowners or sensitive environmental areas such as wetlands. Examples of alterations requiring approval include all route realignments and facility location changes resulting from the following:

   a. Implementation of cultural resources mitigation measures

   b. Implementation of endangered, threatened, or special concern species mitigation measures

   c. Recommendations by state regulatory authorities

   d. Agreements with individual landowners that affect other landowners or could affect sensitive environmental areas.

6. **Within 60 days of the acceptance of this certificate and before the start of construction**, Port Dolphin shall file an initial Implementation Plan with the Secretary for review and written approval by the Director of OEP. Port Dolphin must file revisions to the plan as schedules change. The plan shall identify the following:

a. How Port Dolphin will implement the construction procedures and mitigation measures described in its application and supplements (including responses to data requests), those identified in the EIS, and those required by the Order.

b. How Port Dolphin will incorporate these requirements into the contract bid documents, construction contracts (especially penalty clauses and specifications), and construction drawings so that the mitigation required at each site is clear to onsite construction and inspection personnel.

c. The number of EIs assigned per spread, and how the company will ensure that sufficient personnel are available to implement the environmental mitigation.

d. Company personnel, including EIs and contractors, who will receive copies of the appropriate material.

e. The training and instructions Port Dolphin will give to all personnel involved with construction and restoration (initial and refresher training as the project progresses and personnel change), with the opportunity for OEP staff to participate in the training session(s).

f. The company personnel (if known) and specific portion of Port Dolphin's organization having responsibility for compliance.

g. The procedures (including use of contract penalties) Port Dolphin will follow if noncompliance occurs.

h. For each discrete facility, a Gantt or PERT chart (or similar project-scheduling diagram), and dates for the following:

i. The completion of all required surveys and reports

ii. The mitigation training of onsite personnel

iii. The start of construction

iv. The start and completion of restoration.

7. Port Dolphin shall employ at least one EI per construction spread. The EI shall be:

a. Responsible for monitoring and ensuring compliance with all mitigation measures required by the Order and other grants, permits, certificates, or other authorizing documents

b. Responsible for evaluating the construction contractor's implementation of the environmental mitigation measures required in the contract (see condition 5 above) and any other authorizing document

c. Empowered to order correction of acts that violate the environmental conditions of the Order, and any other authorizing document

d. A full-time position, separate from all other activity inspectors

e. Responsible for documenting compliance with the environmental conditions of the Order, as well as any environmental conditions/permit requirements imposed by other Federal, state, or local agencies

f. Responsible for maintaining status reports.

8. Port Dolphin shall file updated status reports with the Secretary, prepared by the EI on a biweekly basis until all construction and restoration activities are complete. On request, these status reports will also be provided to other Federal and state agencies with permitting responsibilities. Status reports shall include the following:

a. The current construction status of the project, work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally sensitive areas

b. A listing of all problems encountered and each instance of noncompliance observed by the EIs during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other Federal, state, or local agencies)

c. Corrective actions implemented in response to all instances of noncompliance, and their cost

d. The effectiveness of all corrective actions implemented

e. A description of any landowner/resident complaints which might relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns

f. Copies of any correspondence received by Port Dolphin from other Federal, state, or local permitting agencies concerning instances of noncompliance.

9. Port Dolphin must receive written authorization from the Director of OEP **before commencing service of the project**. Such authorization will only be granted following a determination that rehabilitation and restoration of the ROW and other areas affected by the Project are proceeding satisfactorily.

10. Port Dolphin shall not begin construction of the onshore portion of the Project until it has filed documentation that all Section 7 consultations with the USFWS regarding the onshore portion of the Project have been completed and Port Dolphin has received written notification from the Director of OEP that construction or use of mitigation may begin.

11. Prior to the start of construction, Port Dolphin shall file for each HDD location the following: (a) the estimated number of days of drilling required for each location, and whether drilling would be done 24 hours per day; and (b) a description of any noise mitigation which would be implemented during drilling activity to reduce noise impacts at the noise-sensitive areas below 55 A-weighted decibels (dBA) L_{dn}, or 10 dBA over background if ambient levels are above 55 dBA L_{dn}.

12. Port Dolphin shall not begin construction and use of the onshore facilities and staging, storage, and temporary work areas until Port Dolphin consults the Florida State Historic Preservation Officer (SHPO) regarding the need for survey of any newly identified pullouts, staging areas, and extra work spaces; and files the SHPO's comments, any required survey report(s), and the SHPO's comments on the reports. All material filed with the Commission containing location, character, and ownership information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering as follows: **"CONTAINS PRIVILEGED INFORMATION--DO NOT RELEASE."**

Cumulative Impacts

Several cumulative impacts would occur upon implementation of the Project. Most would arise in connection with other OCS activities. Several reasonably foreseeable future actions were identified in Tampa Bay and the GOM. Long-term impacts from Port operations on water quality, socioeconomics, recreation, transportation, and risk management (safety) would be localized. Some long-term, minor, adverse, cumulative impacts on biological resources, including marine mammals, sea turtles, fisheries resources, and EFH, could be associated with operation of the Port.

Water Quality. Marine water quality would be minimally affected by Port construction activities, and no incremental impacts on water quality would occur. Port fabrication activities and the discharges resulting from those activities would occur at existing fabrication facilities and would not be expected to result in any exceedances of permit effluent limitations. Since fabrication activities are not expected to occur at the same time or in the same locations as component fabrication for other Ports, no cumulative impacts would be expected. Therefore, only minor cumulative impacts on coastal water quality, within the limitations of the existing water quality permit, would be expected. Processed bilge water and treated sanitary water discharges from vessels would occur on an intermittent basis, while engine cooling water discharges would occur continuously. Port discharges would only produce minor incremental cumulative impacts on marine and coastal water quality and, if discharged in compliance with an approved NPDES permit, would produce only minor, localized changes to ambient marine water quality. No sodium hypochlorite treatment for cooling water is planned. Dredging and trenching operations required for pipeline installation would not interact with the construction activities for other LNG projects because they would not occur at the same time. Suspended sediments would remain in the water column for a period of time (i.e., hours to days) depending on the size of the sediments. Coarser sediments would fall out and resettle quickly (i.e., hours), while finer sediments could remain suspended for longer periods of time (i.e., days).

Biological Resources. The Port could interact with other OCS activities to produce long-term, adverse, cumulative impacts on biological resources. Marine mammals are and have been severely impacted by an increase in vessel traffic, turbidity, marine debris, and water quality degradation from waste discharges. Sea turtles and manatees are and have been impacted by vessel traffic, turbidity, an increase in marine debris, and a general increase in water quality degradation from waste discharges. Coastal and marine birds are and have been impacted by an increase in marine debris and a disturbance of nesting and foraging areas resulting from onshore construction. Benthic communities currently are and have been impacted by construction and installation of OCS pipelines, fishing, and vessel anchoring. The adverse impacts on these resources from construction and operation of the proposed Port are expected to be minor. Cumulative impacts from vessel traffic are indeterminant since there is currently no method of correlating vessel traffic with potential for ship strikes on marine mammals, sea turtles, or manatees. Further evaluation is being conducted to determine if correlations can be made and impacts more directly assessed.

For all future deepwater port licenses issued, the Maritime Administration could require the Applicant to develop and implement a *Prevention, Monitoring, and Mitigation Plan* to mitigate impacts on marine fisheries species, including meroplankton (organisms that spend part of their life cycle, usually the larval or egg stages, as plankton). Mitigation efforts would also extend to other marine fisheries species when, in the judgment of the Maritime Administrator and after consultation with NMFS, the monitoring program has identified adverse impacts. At this time, mitigation has not been fully developed and therefore, the effectiveness of that mitigation is uncertain.

Cultural Resources. The Port would be constructed to avoid impacts on cultural resources that are listed or eligible for listing in the NRHP. An unanticipated discoveries plan and an avoidance plan have been developed to protect cultural resources during construction. Implementation of the plans is necessary to avoid adverse direct, indirect, or cumulative impacts on cultural resources listed or eligible for listing in the NRHP. If these avoidance efforts were successful, there would be no adverse direct, indirect, or cumulative impacts on cultural resources listed or eligible for listing in the NRHP.

Geological Resources. Communities in the Tampa Bay area use sand resources found in Tampa Bay to renourish local beach fronts. The Proposed Action traverses potential sand resources that could be used for renourishment projects. The Gulfstream Pipeline was installed in an area that might have contained potential sand resources that were not identified at the time of construction. Because the area impacted by

the pipeline buffer is a small percentage of the mapped sand resources, only minor, adverse, cumulative impacts are expected.

Marine Areas and Land Use. Minor, adverse, localized, cumulative impacts on marine or land areas are anticipated. A Safety Zone would extend 850 m from the buoy when a ship is at the Port. This Safety Zone would limit recreational and commercial fishing traffic through the area. The USCG, in consultation with Captain of the Port, Tampa, would likely restrict anchoring near the Port at any time by establishing a No Anchor Area (NAA).

Recreation and Aesthetics. A minor, short-term, adverse impact on recreational fishing would result from temporary displacement associated with offshore Port and pipeline construction activities. Visual resources might be adversely affected by the temporary presence of pipe-laying vessels. Except for recreational vessels that are in the area of the Port, no cumulative visual impacts are expected. Avoiding Safety Zones would be inconvenient to recreational boaters. These impacts are expected to be minor.

Air Quality. Cumulative impacts on air quality from past and present actions would be expected from offshore emissions from cargo and other vessels and onshore emissions sources from power plants and vehicles. Foreseeable future actions that are anticipated to contribute to cumulative impacts include population growth and coastal development, such as factories, which will eventually lead to more demand on electric power. Construction and operation of the MPEH and BOET LNG Deepwater Ports and associated pipelines would be expected to contribute to minor, adverse, cumulative impacts on air quality. Expansion projects for the Big Bend and Bartow Electric Generating stations included installation of emissions-control equipment and replacement of oil-fired units with natural gas units This contributed to reductions in emissions of NO_x and sulphur dioxide (SO_2), and increases in emissions of CO and VOCs. Modeling results showed minor increases in impacts from these pollutants. Therefore, cumulative air quality impacts are expected to be minor.

Noise. Port operations would be distant from any onshore (human) noise sensitive areas and would have no adverse short-term or long-term impacts on those areas. Increased service vessels would have minor long-term, adverse impacts on onshore noise. The support vessels would operate in areas with existing support services. The long-term, adverse, cumulative impacts from the Port would be negligible relative to the noise from existing shipping traffic in the area.

Socioeconomics and Environmental Justice. Construction and operation of deepwater port projects have the potential to beneficially affect socioeconomic resources in the GOM region through job creation and expenditures on goods and services. Impacts associated with onshore fabrication yards are not expected to be cumulative. Components and SRVs are expected to be fabricated at overseas facilities. As a result, the potential to interact with construction of the other LNG ports or major construction activities to produce a cumulative impact is negligible. Relative to the existing economic activities in the region, the cumulative employment associated with the Project would have a negligible, short-term, beneficial impact on area economies. Because of the minor nature of potential losses to fishery stocks, only minor, indirect, adverse impacts on commercial fishing are expected.

Navigation and Transportation. Transportation increases from the construction and operation of the Port are expected to have moderate impacts on the cumulative traffic that currently uses the Egmont shipping fairway and the Tampa/Hillsborough Bay channel. Approximately 1,800 trips are expected during construction of the Port. Crew and supply vessels that travel in and out of Tampa Bay during the operation of the Port are expected to add minor traffic to the existing traffic patterns.

***Public Safety*.** There are small but potentially significant risks associated with the storage and handling of LNG. However, there is no direct cumulative impact on activities outside of the Safety Zone or ATBA. An Independent Risk Assessment for the Project estimated the maximum thermal radiation distance to be 7,330 m (4.6 mi). Since the Port locations are at least 28 miles from the nearest shoreline, the potential for direct impacts is minor.

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FINAL ENVIRONMENTAL IMPACT STATEMENT ADDRESSING THE PORT DOLPHIN LLC LIQUEFIED NATURAL GAS DEEPWATER PORT LICENSE APPLICATION

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
$\mu g/m^3$	micrograms per cubic meter
µPa	Micro Pascals
AAV	Ambient Air Vaporization
ABR	auditory brainstem response
ACHP	Advisory Council on Historic Preservation
AHTS	anchor-handling tug supply
AO	Archeological Occurrence
AP	Aquatic Preserve
APE	area of potential effect
APRS	acoustic position reporting system
AQRV	Air-Quality Related Values
ATBA	Area to be Avoided
ATON	Aids to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BA	Biological Assessment
BACT	Best Available Control Technology
BMP	best management practices
BO	Biological Opinion
BOET	Bienville Offshore Energy Terminal
BP	before present
bscf	billion standard cubic feet
BTA	Best Technology Available
Btu	British thermal units
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAM	Compliance Assurance Monitoring
CBC	Christmas Bird Count
CEMS	continuous emissions monitoring system
CEQ	Council on Environmental Quality
CFD	Cubic feet per day
CFR	Code of Federal Regulations
CH	critical habitat
CH_4	methane
cm	centimeter
cm/s	centimeters per second
CO	carbon monoxide
CO_2	carbon dioxide
COLREGS	International Regulations for Prevention of Collisions at Sea
COMDTINST	Commandant's Instruction
COMPS	Coastal Ocean Monitoring and Prediction System
CORMIX	Cornell Mixing Zone Expert System
COTP	Captain of the Port
CPD	Coastal Programs Division
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DAT	deposition assessment threshold
dB	decibel
dBA	A-weighted decibel
DCS	defense communications system
DF	dual fuel

DGPS	differential global positioning system
DHS	Department of Homeland Security
DMF	Division of Marine Fisheries
DOD	Department of Defense
DOE	Department of Energy
DOI	Department of the Interior
DSM	demand-side management
DSV	direct support vehicle
DWPA	Deepwater Port Act of 1974
EEZ	Exclusive Economic Zone
EFH	essential fish habitat
EI	environmental inspector
EIA	Energy Information Administration
EIS	Environmental Impact Statement
EO	executive order
EPCHC	Environmental Protection Commission of Hillsborough County
ERG	Electroretinography
ESA	Endangered Species Act
ESD	Emergency Shutdown
ESU	Evolutionary Significant Unit
F&G	fire and gas
F.A.C.	Florida Administrative Code
FAAQS	Florida Ambient Air Quality Standards
FAS	Floridan Aquifer System
FCMP	Florida Coastal Management Program
FDEP	Florida Department of Environmental Protection
FDHR	Florida Division of Historic Resources
FDMS	Federal Docket Management System
FDOT	Florida Department of Transportation
FERC	Federal Energy Regulatory Commission
FERP	Florida Environmental Resource Permit
FFMZ	Federal Fishery Management Zone
FGT	Florida Gas Transmission
FLM	Federal Land Manager
FLUCCS	Florida Land Use, Cover, and Forms Classification System
FM	feet marker
FMC	Fishery Management Council
FMP	Fishery Management Plan
FMRI	Florida Marine Research Institute
FMSF	Florida Master Site File
FMV	Fair Market Value
FNAI	Florida Natural Areas Inventory
FOSC	Federal On Scene Coordinator
FP	floating platform
FPL	Florida Power and Light Company
FPSC	Florida Public Service Commission
FPSO	floating production, storage, and offloading
FRCC	Florida Reliability Coordinating Council
FSA	Facility/Vessel Security Assessment
FSO	Facility/Vessel Security Officer
FSP	Facility/Vessel Security Plan
FSRU	floating storage and regasification unit

ft/s	feet per second
FWC	Florida Fish and Wildlife Conservation Commission
FY	Fiscal Year
g/ha-yr	grams per hectare per year
gal	Gallon
GAO	Government Accountability Office
GBS	gravity-based structure
GHG	greenhouse gas
GIS	Geographical information system
GMFMC	GOM Fishery Management Council
GOM	Gulf of Mexico
GOMESA	Gulf of Mexico Energy Security Act
GPD	gallons per day
gpm	gallons per minute
GPS	Global Positioning System
HAP	Hazardous Air Pollutant
HAZID	hazards identification
HCA	high consequence area
HDD	horizontal directional drill
hp	horsepower
Hz	Hertz
IAS	Intermediate Aquifer System
ICI	industrial-commercial-institutional
ID	inside diameter
IGC	International Code for Construction and Equipment of Ships Carrying Liquefied Gasses in Bulk
IHA	incidental harassment authority
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
IRA	independent risk assessment
ISPS	International Ship and Port Facility Security
IWAQM	Interagency Workgroup on Air Quality Modeling
JTTF	Joint Terrorism Task Force
kg	kilogram
kHz	Kilohertz
km	kilometer
km/hr	kilometers per hour
km^2	square kilometer
kW/m^2	kilowatts per square meter
kWh	kilowatt hours
LAER/BACT	lowest achievable emissions rate/best available control technology
lb	pound
LFL	lower flammability limit
LNB	low-NO_x burner
LNG	liquefied natural gas
LNGC	liquefied natural gas carrier
LOOP	Louisiana Offshore Oil Port
m	meter
m/s	meters per second
m^2	square meter
m^3	cubic meter
MAFLA	Mississippi, Alabama, and Florida
MAOP	maximum allowable operating pressure
MARPOL	International Convention for the Prevention of Pollution from Ships
mcf	million cubic feet
MD	Management Directive

mg/L	milligram per liter
mg/m^3	milligrams per cubic meter
MGD	million gallons per day
mi	mile
mi^2	square miles
MLLW	mean lower low water
mm	millimeter
MMBtu	million British thermal units
MMBtu/hr	million British thermal units per hour
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
MMscfd	million standard cubic feet per day
MOU	Memorandum of Understanding
MPA	marine protected areas
MPEH	Main Pass Energy Hub™
mph	miles per hour
MPRSA	Marine Protection, Research, and Sanctuaries Act
MRFSS	Marine Recreational Fishery Statistics Survey
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act of 1976
MT/hr	metric tons per hour
MTS	U.S. Marine Transportation System
MTSA	Maritime Transportation Security Act
MW	megawatt
NAA	No Anchoring Area
NAAQS	National Ambient Air Quality Standards
NAIC	North American Industrial Classification
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NGA	Natural Gas Act
NHPA	National Historic Preservation Act
NM	Nautical mile
NMFS	National Marine Fisheries Service
NMS	National Marine Sanctuary
NMSA	National Marine Sanctuaries Act
NNSR	Non-attainment New Source Review
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NODC	National Oceanographic Data Center
NOI	Notice of Intent
NO_x	nitrogen oxide
NP	National Park
NPC	National Petroleum Council
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NPV	Net Present Value
NRHP	National Register of Historic Places
NSA	noise sensitive area
NSPS	New Source Performance Standards
NSR	New Source Review
NTL	Notice to Lessees and Operators
NTU	Nephelometric turbidity unit

NWI	National Wetland Inventory
NWR	National Wildlife Refuge
O_3	ozone
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
ODMDS	Ocean Dredged Material Disposal Site
OEP	Office of Energy Projects
OFW	Outstanding Florida Waters
OPS	Office of Pipeline Safety
ORV	open rack vaporizer
OSHA	Occupational Safety and Health Administration
PA&A	public address and alarm
Pb	lead
PB	St. Petersburg (lease block)
PCB	polychlorinated biphenyl
PHMSA	Pipeline and Hazardous Materials Safety Administration
PLC	Programmable Logic Controllers
PLEM	pipeline end manifold
PM_{10}	particulates equal to or less than 10 microns in diameter
$PM_{2.5}$	particulates equal to or less than 2.5 microns in diameter
ppm	parts per million
ppmvd	parts per million by volume, on a dry basis
ppt	parts per thousand
PSD	Prevention of Significant Deterioration
psi	pounds per square inch
psig	pounds per square inch gauge
PTS	Permanent threshold shift
RACON	radar beacon
RACT	reasonable available control technology
RLNGC	Regasification Liquid Natural Gas Carriers
ROD	Record of Decision
ROI	Region of Influence
ROW	right-of-way
RPT	rapid phase transition
RTD	resistance thermal device
SAFMC	South Atlantic Fishery Management Council
SAS	Surficial Aquifer System
SCR	selective catalytic reduction
SCV	submerged combustion vaporizer
SEAMAP	South East Area Monitoring and Assessment Program
SEARCH	Southeastern Archeological Research, Inc.
SED	Statistics and Economics Division
SHPO	State Historic Preservation Officer
SIGTTO	Society of International Gas Tanker and Terminal Operators
SIL	Significant Impact Level
SIP	State Implementation Plan
SO_2	sulfur dioxide
SOLAS	Safety of Life at Sea
SPCC	Spill Prevention, Control, and Countermeasures
SPL	sound pressure level
SPV	Special Purpose Vessel
SRS	Special Regasification Ship
SRV	shuttle and regasification vessel
STL	submerged turret loading
STSSN	Sea Turtle Stranding and Salvage Network

STV	shell-and-tube vaporizers
SWFWMD	Southwest Florida Water Management District
TBEP	Tampa Bay Estuary Program
tcf	trillion cubic feet
TECO	Tampa Electric Company
TMDL	Total Maximum Daily Load
TMR	triple modular redundancy
tpy	tons per year
TRV	Transfer and Regasification Vessel
TSS	total suspended solids
TTS	temporary threshold shift
U.S.C.	United States Code
UFL	upper flammability limit
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USNOC	U.S. Naval Oceanographic Office
UV/IR	ultraviolet/infrared
VOC	volatile organic compound
VTR	vehicle trip report
yd^3	cubic yards

COMMON CONVERSIONS

Temperature

°F =	°C x 1.8 + 32
°C =	(°F – 32) ÷ 1.8

Length/Distance

1 in =	2.540 cm
1 in =	25.40 mm
1 ft =	0.3048 m
1 m =	3.2808 ft
1 mi =	1.6093 km
1 km =	0.6214 mi
1 NM =	1.15 mi

Volume

1 ft^3 =	0.02832 m^3
1 gal =	0.003785 m^3
1 m^3 =	264.172 gal
1 gal =	0.0238 bbl
1 m^3 =	6.29 bbl
1 MG =	23,800 bbl

Mass

1 g =	0.0022 lb
1 lb =	0.453592 kg
1 kg =	2.205 lb
1 ton =	0.9072 MT

Flow Rate (unit volume per time)

1 bbl/hr =	0.1192 m^3/hr
1 ft^3/s =	0.028316 m^3/s
1 ft^3/s =	448.8 GPM
1 GPD =	0.003785 m^3/day
1 GPM =	0.00379 m^3/min
1 MGD =	0.0438 m^3/s

Velocity

1 ft/s =	0.3048 m/s
1 ft/s =	30.48 cm/s
1 m/s =	1.467 ft/s

Concentration

1 mg/L =	1 ppm (in water)
1 mg/L =	1 x 10^6 µg/m^3

Energy

1 Btu =	2.9308 x 10^{-4} kW-hr

Power

1 kW =	1.340 hp
1 hp =	0.746 kW

Pressure

1 psi =	psig + atmospheric pressure
1 psi =	0.0689476 bar
1µPa =	145 psi

COVER

FINAL EIS

USCG FINAL ENVIRONMENTAL IMPACT STATEMENT

ADDRESSING THE

PORT DOLPHIN LLC LIQUEFIED NATURAL GAS DEEPWATER PORT LICENSE APPLICATION

DOT DOCKET NUMBER: USCG-2007-28532

PREPARED BY: engineering-environmental Management, Inc. (e^2M)
for
USCG Deepwater Ports Standards Division (CG-5225)
U.S. Coast Guard Headquarters
2100 Second Street, SW Stop 7126
Washington, DC 20593-7126

CONTACT INFORMATION: M.A. Prescott, USCG, CG-5225, (202) 372-1440

Port Dolphin Energy LLC, proposes to own, construct, and operate a deepwater port, named Port Dolphin, in the Federal waters of the Outer Continental Shelf in lease blocks designated by the Minerals Management Service as St. Petersburg (PB) blocks: PB545, PB546, PB547, PB548, PB504, PB505, PB506, PB507, PB463, and PB589. These blocks are approximately 28 miles off the west coast of Florida to the southwest of Tampa Bay. Port Dolphin would consist of a permanently moored unloading buoy system with two submersible buoys separated by a distance of approximately 3 miles. The buoys would be designed to moor a specialized type of liquefied natural gas vessel called a Shuttle and Regasification Vessel (SRV) of either 145,000 or 217,000 cubic meter capacity. Natural gas would be delivered to shore from Port Dolphin via a proposed new 36-inch-diameter-pipeline, approximately 42 miles in length, that would connect onshore in Manatee County, Florida, with the Gulfstream Natural Gas System, LLC, and Tampa Electric Company (TECO) Bayside pipeline. Initially, Port Dolphin would be capable of a natural gas throughput of 400 million standard cubic feet per day (MMscfd) and would eventually be capable of an average of 800 MMscfd with a peak capacity of 1,200 MMscfd.

DATE OF PUBLICATION: July 10, 2009

DATE COMMENTS MUST BE RECEIVED: August 24, 2009

30 Jun 09	Melissa Penn	Deepwater Ports NEPA Specialist
Date	Preparer/Environmental Project Manager	Title/Position
30 Jun 2009	Mary G. Prescott	Chief, Deepwater Ports Standards
Date	Environmental Reviewer	Title/Position

This document has been prepared in support of the Administrator of the Maritime Administration for purposes of issuing a Record of Decision for this deepwater port application license.

30 Jun 2009	Mary G. Prescott	Chief, Office of Operating and Environmental Standards
Date	Responsible Official	Title/Position

FINAL ENVIRONMENTAL IMPACT STATEMENT ADDRESSING THE PORT DOLPHIN LLC DEEPWATER PORT LICENSE APPLICATION

Location: In the Gulf of Mexico, approximately 28 miles off the western coast of Florida, and approximately 42 miles from Port Manatee, Manatee County, Florida.

Docket Number: USCG-2007-28532.

Prepared By: The lead agencies, U.S. Coast Guard (USCG) and the Maritime Administration, and their contractor, engineering-environmental Management, Inc. (e^2M).

Cooperating Agencies: Federal Energy Regulatory Commission; U.S. Environmental Protection Agency; U.S. Department of the Interior, Minerals Management Service and U.S. Fish and Wildlife Service; U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries); U.S. Army Corps of Engineers.

Contact Information: M.A. Prescott (CG-5225), 2100 Second Street, SW, Washington, DC 20593-0001, 202-372-1440.

Abstract: Port Dolphin Energy LLC, proposes to own, construct, and operate a deepwater port, named Port Dolphin, in the Federal waters of the Outer Continental Shelf in lease blocks designated by the Minerals Management Service as St. Petersburg (PB) blocks: PB545, PB546, PB547, PB548, PB504, PB505, PB506, PB507, PB463, and PB589. These blocks are approximately 28 miles off the western coast of Florida to the southwest of Tampa Bay, in a water depth of approximately 100 feet. Port Dolphin would consist of a permanently moored unloading buoy system with two submersible buoys separated by a distance of approximately 3 miles. The buoys would be designed to moor a specialized type of liquefied natural gas (LNG) vessel called a Shuttle and Regasification Vessel (SRV). The Applicant would plan to use two classes of SRVs, either 145,000- or 217,000-cubic-meter capacity. When the SRVs are not present, the buoys would be submerged on a special landing pad on the seabed, 60 to 70 feet below the sea surface. SRVs are equipped to vaporize cryogenic LNG cargo to natural gas through an onboard closed-loop vaporization system, and to meter gas for send-out by means of the unloading buoy to a 36-inch flowline to a Y-intersection, and then to a 36-inch pipeline approximately 42 miles in length that would connect onshore in Manatee County, Florida, with the Gulfstream Natural Gas System, LLC, and Tampa Electric Company (TECO) Bayside pipeline. Only SRVs would call on Port Dolphin. Initially, Port Dolphin would be capable of a natural gas throughput of 400 million standard cubic feet per day (MMscfd) and would eventually be capable of an average of 800 MMscfd with a peak capacity of 1,200 MMscfd. Construction of Port Dolphin would be expected to take 11 months. Port Dolphin deepwater port would be designed, constructed, and operated in accordance with applicable codes and standards and would have an expected operating life of approximately 25 years.

Date of Publication: July 2009

FINAL

ENVIRONMENTAL IMPACT STATEMENT

ADDRESSING THE

PORT DOLPHIN LLC
DEEPWATER PORT LICENSE APPLICATION

Maritime Administrator
United States Maritime Administration
Southeast Federal Center
1200 New Jersey Ave, SE
Washington, DC 20590

and

Commandant
United States Coast Guard
Deepwater Ports Standards Division (CG-5225)
2100 Second Street, SW
Washington, DC 20593-0001

Docket No. USCG-2007-28532

The Federal Docket Management System
is available at <*http://www.Regulations.gov*>.

JULY 2009

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7 trees preserved for the future

21 lbs waterborne waste not created

3,131 gallons wastewater flow saved

346 lbs solid waste not generated

682 lbs net greenhouse gases prevented

5,220,360 BTUs energy not consumed

Executive Summary

Introduction

On March 29, 2007, Port Dolphin Energy LLC (also referred to as the Applicant, or as Port Dolphin) submitted to the U.S. Coast Guard (USCG) and Maritime Administration an application under the Deepwater Port Act of 1974 (DWPA)[1] for all Federal authorizations required for a license to own, construct, and operate a deepwater port off the coast of Florida. On June 15, 2007, USCG notified the Applicant that the application contained sufficient information to continue processing, and on June 25, 2007, the USCG and the Maritime Administration issued a Notice of Application in the *Federal Register* summarizing the application[2]. In December 2007, the Applicant filed an amended application that proposed a new pipeline route intended to avoid sensitive biological resource areas (Port Dolphin 2007b). In December 2008 the Applicant filed a second amendment to the application. The second amendment proposed a new pipeline route intended to avoid sand resource areas used for beach replenishment (Port Dolphin 2008d). The Port Dolphin project, referred herein to as the Project, was assigned Docket No. USCG-2007-28532.

The staffs of the USCG and Maritime Administration prepared this Environmental Impact Statement (EIS) to address the potential environmental and socioeconomic impacts associated with the Project. The Maritime Administration is the lead Federal agency responsible for licensing of the deepwater port, which is proposed to consist principally of two unloading buoys for mooring liquefied natural gas (LNG) vessels and a pipeline connecting to two existing onshore natural gas pipelines.

Concurrent with their application for the deepwater port, the Applicant submitted an application to the Federal Energy Regulatory Commission (FERC) for a Certificate of Public Convenience and Necessity (Certificate) under Section 7 of the Natural Gas Act (NGA), as amended, to construct and operate a new natural gas pipeline and ancillary facilities in Florida. FERC is the cooperating Federal agency responsible for the review of the onshore portion of the natural gas pipelines and associated aboveground components. The application was assigned FERC Docket Nos. CP07-191 and -192. FERC issued a Notice of Application in the *Federal Register* for the Proposed Onshore Pipeline on May 9, 2007[3]. After discussions with the Florida Department of Environmental Protection, the Applicant made changes to their onshore pipeline route. Subsequently, the Applicant filed an amended application with the FERC. On January 28, 2008, the FERC issued a new Notice of Amendment for the Proposed Onshore Pipeline which was published in the *Federal Register* on February 4, 2008[4]. The amended application was assigned Docket No. CP07-191-001. FERC also opened an additional scoping period to solicit comments on the proposed revisions to the onshore pipeline route. In January 2009, the Applicant filed a second amendment with FERC that modified details of the construction of the onshore pipeline. The Applicant also filed applications with the U.S. Army Corps of Engineers (USACE) for Department of the Army permits pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 United States Code [U.S.C.] 403) and Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344). The USACE has jurisdiction over the wetlands associated with the Proposed Onshore Pipeline. The Applicant also filed its applications for coverage under the Clean Air Act (CAA) and CWA with the U.S. Environmental Protection Agency (USEPA). This EIS is the supporting document for FERC's certification under the NGA, USACE's permit decisions related to Section 10 of the Rivers and Harbors Act and Section 404 of the CWA, and USEPA's permit decisions and related consultations under the CWA and CAA.

[1] Public Law (P.L.) 93-627, Sec. 3, January 3, 1975, 88 Stat. 2127, as amended, codified to 33 U.S.C. 1501–1524.
[2] 72 FR 121, pp. 34741–2.
[3] 72 FR 94, pp. 27552–3.
[4] 73 FR 23, pp.6497–8.

The DWPA establishes a licensing system for ownership, construction, and operation of deepwater ports in waters beyond the territorial limits of the United States. Originally, the DWPA promoted the construction and operation of deepwater ports as a safe and effective means of importing oil into the United States and transporting oil from the Outer Continental Shelf (OCS), while minimizing tanker traffic and associated risks close to shore. The Maritime Transportation Security Act of 2002 amended the definition of "deepwater port" to include facilities for the importation of natural gas[5].

LNG is natural gas that has been cooled to about minus 260 degrees Fahrenheit (°F) (-162.2 degrees Celsius [°C]) for efficient shipment and storage as a liquid. LNG is more compact than the gaseous equivalent, with a volumetric differential of about 610 to 1. LNG can be transported long distances across oceans using specially designed ships, thus allowing access to stranded reserves of natural gas that cannot be transported by conventional pipelines.

Under the DWPA, all deepwater ports must be licensed by the Secretary of Transportation (Secretary). On June 18, 2003, the Secretary delegated authority to the Maritime Administrator (Administrator) to issue, transfer, amend, or reinstate a license for the construction and operation of a deepwater port[6]. Hereafter, "the Administrator" refers to the Maritime Administrator's actions and responsibilities as the delegated representative of the Secretary. The USCG is preparing the EIS in coordination with the Maritime Administration although USCG is now part of the Department of Homeland Security (DHS)[7]. The DWPA requires a license applicant to submit detailed plans for its facility.

Purpose and Need

The purpose of licensing deepwater ports for importing LNG in the OCS is to provide a reliable and timely supply of natural gas that would increase energy diversity while considering impacts on the environment to serve the growing demand for natural gas for residential, industrial, and electric generation within west-central Florida. This requires construction of appropriate facilities for receiving the LNG, revaporizing the LNG to gaseous state, and interconnecting the facility to the transmission pipelines that can reach appropriate markets within the United States.

The DWPA of 1974, as amended, was passed to promote and regulate the construction and operation of deepwater ports as a safe and effective means of importing oil or natural gas into the United States. The DWPA requires the Administrator to approve, approve with conditions, or deny a deepwater port license application. The Congressional intent expressed in 33 U.S.C. 1501 is as follows:

- "authorize and regulate the location, ownership, construction and operation of deepwater ports in waters beyond the territorial limits of the U.S."
- "provide for the protection of the marine and coastal environment to prevent or minimize any adverse impact that might occur as a consequence of the development of such ports"
- "protect the interests of the U.S. and those of adjacent coastal States in the location, construction, and operation of deepwater ports"

[5] P.L. 107-295, Section 106, November 25, 2002, 116 Stat. 2064.
[6] 68 FR 36496–97.
[7] Title XV (Transition) of the Homeland Security Act provides that "pending matters," including license applications currently being processed, will continue regardless of the transfer of USCG from the U.S. Department of Transportation (USDOT). Even though the function of processing applications has been transferred with USCG to the U.S. Department of Homeland Security, the Secretary of Transportation retains ultimate authority to issue, transfer, amend, or reinstate licenses under the Deepwater Port Act.

- "protect the rights and responsibilities of the States and communities to regulate growth, determine land use, and otherwise protect the environment in accordance with law"
- "promote the construction and operation of deepwater ports as a safe and effective means of importing oil and natural gas into the U.S. and transporting oil and natural gas from the outer continental shelf while minimizing tanker traffic and the risks attendant thereto"
- "promote oil and natural gas production on the outer continental shelf by affording an economic and safe means of transportation of outer continental shelf oil and natural gas to the U.S. mainland."

Part of the intent for establishing the DWPA was to provide a mechanism to meet the nation's existing and estimated demand for energy supplies by increasing access to worldwide sources. The recent DWPA amendments to include LNG facilities indicate that Congress recognizes the potential for LNG imports to become a key energy supply source in the United States over the coming years.

Florida is heavily dependent on natural gas as a source of energy for electricity, home heating, and other uses. Based on future projections, there is a growing demand for additional natural gas in this area; however, this demand cannot be met by the existing domestic supply or by existing natural gas pipelines. The predominant energy concerns expressed in all the energy assessments and plans developed by the State of Florida in recent years relate to energy security, including the need for fuel diversity and fuel supply reliability. These plans identify the increasing dependency of Florida's electrical-generating utilities on natural gas (particularly given the volatility in its availability and price) and stress the need to return to the practice of balanced fuel supply. However, opposition to coal-fired generation and the long lead time needed to implement a balanced fuel supply will still result in increases in natural gas consumption by utilities. Moreover, the state is extremely dependent on natural gas supplies originating from the Gulf of Mexico (GOM), which is mainly transported via two natural gas pipelines. The potential for future disruptions of Florida's economy resulting from hurricane-inflicted damage to either gas field infrastructure or the pipelines is significant. By expanding Florida's natural gas infrastructure, an LNG deepwater port also would provide the state's natural gas markets with fuel supply diversity through global sourcing of LNG. The Port Dolphin project would provide a source of natural gas to western Florida that is independent of both GOM supply disruptions and of the pipeline constraints of the existing interstate pipelines.

Scope and Organization of the EIS

This EIS assesses potential environmental impacts associated with the installation, operation, and decommissioning of the Port. The affected environmental components encompassed by this EIS include water resources, biological resources, cultural resources, geological resources, marine areas and land use, recreation and aesthetics, air quality, noise, socioeconomic resources and environmental justice, and navigation and transportation. The EIS describes the Project and potential alternatives (**Section 2**), the affected environment as it currently exists (**Section 3**), the probable environmental consequences that might result from installation and operation of Port Dolphin (**Section 4**), public safety (**Section 5**), and cumulative and other impacts (**Section 6**). **Section 7** covers greenhouse gas emissions from the project. A list of preparers and references used in preparing the document are provided in **Sections 8** and **9**, respectively. Volume II and Volume III contain the appendices, including public comments, records of coordination with Federal and state agencies, applicable laws and executive orders (EOs), detailed maps, and specific biological information.

Public Review and Comment

Agency and public participation in the National Environmental Policy Act (NEPA) process promotes open communication between the public and the government and enhances decisionmaking. All persons and organizations having a potential interest in the Administrator's decision whether to grant the License are encouraged to participate in the decisionmaking process.

The USCG and the Maritime Administration initiated the public scoping process on July 12, 2007, with the publication of a Notice of Intent (NOI) to prepare an EIS in the *Federal Register*. The NOI included information on public meetings and informational open houses; requested public comments on the scope of the EIS; and provided information on how the public could submit comments by mail, hand delivery, facsimile, or electronic means[8]. Documents and comments for this project can be found at http://www.regulations.gov. Users can type in the complete docket number, USCG-2007-28532, and view all related documents, and submit a comment.

An Interested Party Letter, the NOI published in the *Federal Register*, and a fact sheet describing the Project were sent to approximately 190 Federal, state, and local agency representatives, and other potentially interested parties (see **Appendix A**). As a result of the Applicant's amended application (assigned FERC Docket No. CP07-191-001), the FERC issued a Notice of Limited Scoping for the proposed Port Dolphin project and Request for Comments on Environmental Issues, which was published in the *Federal Register* on February 11, 2008. The Notice indicated that FERC was soliciting input from the public and interested parties and such input would be limited to the proposed onshore pipeline and related facilities (i.e., those under FERC jurisdiction) in Manatee County, Florida. The comment period for scoping closed on March 5, 2008. Public comments submitted as part of the scoping process (see **Appendix A**) were considered during the development of this EIS.

A Notice of Availability for the Draft EIS was published in the *Federal Register* on April 18, 2008. The Draft EIS was uploaded to the Port Dolphin Docket, and more than 200 copies of the Draft EIS were sent to agencies, organizations, and individuals that had expressed interest in reviewing it. An Open House and Public Meeting was held at the Manatee County Convention Center on May 6, 2008, to provide a forum for the public and agencies to obtain information and to provide scoping. The meeting was advertised in the *Tampa Tribune* and the *Bradenton Herald*. The Public Meeting was attended by 41 individuals. Comments on the Draft EIS were accepted through June 2, 2008. Two written comments were provided during the Public Meeting. Seven individuals spoke at the Public Meeting and provided oral comments. A total of 32 comments were received on the USCG Port Dolphin Docket (see **Appendix B**). In total, 34 comments were received during the public review period. All comments on the Draft EIS were considered during the preparation of the Final EIS. **Appendix B** of the EIS includes all materials, including the NOA and other outreach tools used, and all comments on the Draft EIS that were received during the public review period.

Description of the Proposed Action

The Applicant proposes to construct, own, and operate a deepwater port for importation of LNG and send-out of natural gas. Port Dolphin (the Port) would be located approximately 45 kilometers (km) (28 miles [mi]) offshore from Tampa, Florida. The Port would be located in areas designated by the U.S. Department of the Interior (DOI) Minerals Management Service (MMS) as St. Petersburg (PB) blocks: PB545, PB546, PB547, PB548, PB504, PB505, PB506, PB507, PB463, and PB589. The Port would be capable of mooring two LNG carriers (LNGCs), referred to as shuttle and regasification vessels (SRVs), by means of a submerged unloading buoy system. Each of two unloading buoys, also known as

[8] 70 FR 61151–52.

submerged turret loading (STL) buoys, would have eight mooring lines connected to eight pile-driven anchor points in the seafloor. An SRV would typically moor at the deepwater Port for 4 to 8 days. When not connected to an SRV, the STL buoy would be submerged approximately 18.3 to 21.3 meters (m) (60 to 70 feet) below the sea surface and be supported by mooring lines and rest on the STL buoy landing pad. A marker buoy and retrieval line would be used to locate and recover the buoy as an SRV arrives at the deepwater Port. The unloading buoy would be retrieved from its submerged position and hoisted in through a moon-pool in the forward part of the SRV where it would be positioned in a receiving cone within the hull trunk. After the buoy is locked in position, unloading of LNG would begin.

The SRVs proposed for use by the Port would be equipped to transport, store, vaporize, and meter natural gas. A closed-loop, glycol/water-brine heat transfer system would be used to vaporize the LNG. The deepwater port would have an average throughput capacity of 800 million standard cubic feet per day (MMscfd) and a peak capacity of approximately 1,200 MMscfd. Natural gas flowlines from the Port would connect to a 36-inch gas transmission line. The transmission line would interconnect with the existing Gulfstream Pipeline interstate natural gas transmission line and the Tampa Electric Company (TECO) system approximately 73.9 km (46 mi) east of the deepwater port through onshore interconnections. Construction of the deepwater Port components would be expected to take 11 months, with operations planned to commence in the second quarter of 2011. A detailed description of the Applicant's proposal is included in **Section 2.3** of the Final EIS.

Alternatives

The DWPA requires the Secretary to approve, approve with conditions, or deny a deepwater port license application. Consistent with NEPA, in determining the provisions of the license, the Secretary must also consider alternative means to construct and operate a deepwater port. Alternatives for a natural gas deepwater port can extend to matters such as its specific location, methods of construction, and technologies for regasifying LNG. Considering alternatives helps to ensure that decisions concerning the license are well-founded as required by the DWPA and are in the national interest and consistent with national security and other national policy goals and objectives.

Screening was conducted in several steps. First, the conceptual design of the deepwater Port was considered and two designs were selected for evaluation. They are an STL buoy system with special purpose SRV and a Floating, Storage and Regasification Unit (FSRU). Because of environmental and feasibility issues, gravity-based structures, artificial islands, and fixed and floating platform designs were eliminated from further review. A three-phase assessment was then conducted to narrow the potential alternative sites. After site alternatives were identified, alternate routes for the pipelines necessary to interconnect with the existing natural gas transmission structure were evaluated. Finally, specific technology choices, such as vaporization technology, anchoring methods, and construction methods, were evaluated.

Upon application of the screening criteria, alternatives that were eliminated from detailed consideration included Port design concepts, some regasification technologies, design features, and construction methods. Alternatives evaluated in detail in this EIS are the STL and FSRU port concept, two vaporization technologies, two alternatives for siting of the Port in MMS Lease Blocks PB564 and PB190, three natural gas pipeline route alternatives (i.e., a Proposed Site and Route, a Southern Site and Route, and the Offshore Interconnection with Gulfstream Pipeline), and the No Action Alternative.

Proposed Action and Alternative Environmental Impacts

Potential environmental impacts are summarized in the following text by resource area. The impacts described would be essentially the same for both location alternatives, but the Southern Site and Route

alternative would result in more impacts due to the larger footprint, and the Offshore Interconnection with the Gulfstream Pipeline would result in less impacts due to the smaller footprint and avoidance of nearshore areas. **Table ES-1** compares the differences between the two location alternatives and three route alternatives.

Water Quality. A combination of long- and short-term, minor, adverse impacts on water quality would be expected. These would occur with respect to both marine and coastal waters.

Short-term, direct, minor, adverse impacts would include resuspension of sediments that would occur during installation of the Port structures and pipelines, particularly for the pipeline sections closer to Lower Tampa Bay where sediments are finer and would remain suspended for a longer period of time. Onshore pipeline installation, including both trenching and burial and horizontal directional drilling (HDD) methods, would likely encounter groundwater, resulting in a short-term modification of the groundwater flow regime. Construction activities would also be expected to cross some surface waterbodies and wetlands during pipeline installation, but HDD technology would minimize adverse impacts on water quality in these areas. During operations, cooling and bilge water discharges would have several impacts on water quality near the Port, including increased water temperature, increased turbidity, and decreased dissolved oxygen content. Spills of hazardous substances, such as hydrocarbons (e.g., petroleum, oils, and lubricants), might result in short-term, minor, adverse impacts on water quality.

Biological Resources. Minor to moderate, short-term, adverse impacts and minor, long-term, adverse impacts on biological resources could occur as a result of the Project. Onshore activities would have short-term, minor impacts on vegetation and wildlife. Short-term, minor impacts on freshwater wetlands could occur from onshore activities. Permanent minor impacts on forested wetlands would occur, but only a small portion of the impacted wetlands are forested. Brazilian pepper, a nonnative, exotic species, is the dominate species found in forested wetlands along the pipeline route. Permanent minor impacts would also occur to the extractive pond open-water habitats. A permanent levee would be constructed to isolate the area where the proposed pipeline would be placed and the water in the proposed right-of-way (ROW) would be pumped out. Therefore, the pipeline would be placed under hard ground, and the water in the ponds would not be restored in these areas. The ponds currently have little to no vegetation and were formed during mining and other extractive activities. Therefore, impacts on these ponds would be minor.

Short-term, moderate to major, adverse impacts on marine mammals and sea turtles would be due to construction noise. The highest noise intensities would be produced during the installation of the buoy anchors and from HDD operations. The highest operational noise would be from operation of the SRV thrusters during docking at the buoys.

Minor to moderate, short-term and long-term, adverse impacts on benthic communities would occur during the installation of the Port and offshore pipelines. Port and pipeline installation would result in the short-term impacts on approximately 234 acres of benthic habitat and long-term operational impacts on 22.09 acres from seabed sweep from the anchor lines. Approximately 3,000 acres of hard-bottom habitat could be disturbed by pipeline construction. The disturbance could result from anchor cable sweep from the vessels used to plow and lay the pipeline and place armoring mattresses over the pipeline in areas where the pipeline cannot be buried. Proper use of best management practices (BMPs) such as use of midline buoys on anchor cables and design of an anchor placement plan to minimize hard-bottom impacts would reduce the extent of hard-bottom impacts. Recovery of the benthic communities from construction impacts is difficult to predict. Soft-bottom communities would recover before hard-bottom communities. Concrete mattresses would likely be colonized by different communities than what was initially present. Communities impacted during operations by anchor sweep at the 22 acres (16 acres of soft-bottom and 6 acres of hard-bottom) of the Port site would not recover.

Table ES-1. Comparison of Location and Pipeline Alternatives for Port Dolphin

Project Component	Proposed Site and Pipeline Alternative	Southern Site and Pipeline Alternative	Offshore Interconnection with Gulfstream Pipeline
Port Components			
Port C/O footprint	22 acres	30 acres (+36%)	22 acres
Pipeline Components			
Total pipeline length	74.0 km (46 mi)	80.4 km (50 mi) (+9%)	28.8 km (18 mi) (-38%)
Offshore length (from the piggable Y to the bulkhead)	67.6 km (42 mi)	74 km (46 mi) (+9.5%)	N/A
Offshore pipeline construction footprint (3,000-foot construction survey corridor)	16,728 acres	18,180 acres (+ 8%)	6,545 acres (-39%)
Offshore Gulfstream Pipeline crossing	Crosses two times. HDD 1=1,335 feet, HDD 2=2,947 feet	none	N/A
Permitted Sand Borrow Area	0 cubic yards	2,237,225 cubic yards	0 cubic yards
Potential Sand Borrow Areas	48,370,164 cubic yards	63,621,485 cubic yards	0 cubic yards
Offshore shipping channel crossings	none	none	none
Nearshore Terra Ceia crossing	none	Crosses two times. 4.8 km (3.0 mi), and 1.1 km (0.7 mi)	none
Onshore pipeline length	6.4 km (4 mi)	6.4 km (4 mi)	6.4 km (4 mi)
Onshore pipeline C footprint (100-foot ROW)	48.5 acres	48.5 acres	48.5 acres
Onshore O footprint (30-foot ROW)	14.5 acres	14.5 acres	14.5 acres
Onshore wetland crossings C impacts	10.71 acres	10.71 acres	10.71 acres
Onshore wetland crossings O impacts	1.19 acres	1.19 acres	1.19 acres
Onshore Facility and Workspace Components			
Onshore landfall location	Just east of Gulfstream station at Port Manatee	Just east of Gulfstream station at Port Manatee	Just east of Gulfstream station at Port Manatee

Project Component	Proposed Site and Pipeline Alternative	Southern Site and Pipeline Alternative	Offshore Interconnection with Gulfstream Pipeline
Onshore Facility and Workspace Components (continued)			
Aboveground facilities	Interconnection with GS and TECO – 120 x 1,319 feet (3.4 acres) Valve station located on Port Manatee property – 50 x 60 feet (0.07 acres)	Interconnection with GS and TECO – 120 x 1,319 feet (3.4 acres) Valve station located on Port Manatee property – 50 x 60 feet (0.07 acres)	Interconnection with GS and TECO – 120 x 1,319 feet (3.4 acres) Valve station located on Port Manatee property – 50 x 60 feet (0.07 acres)
Onshore extra work spaces (located at the entrance and exit areas for HDD and boring activities)	6 acres	6 acres	6 acres
Staging areas, pipeyard, and contractor facilities would be located on Port Manatee (6 months)	34 acres; includes a concrete batch plant, mattress facility and pipe lay-down areas	34 acres; includes a concrete batch plant, mattress facility, and pipe lay-down areas	34 acres; includes a concrete batch plant, mattress facility, and pipe lay-down areas
Onshore access roads	None (use existing roadways)	None (use existing roadways)	None (use existing roadways)

Notes:
C – Construction; O – Operation
Length and acreage have been rounded to nearest whole number for NEPA planning purposes.

The closed-loop SRVs would adversely impact plankton. The SRVs would require cooling water for the generators that provide power for the vaporization system pumps and blowers, and for hotel loads for normal ship's functions. Prior to submission of the application for this Project, the USCG cooperatively developed an assessment methodology with National Oceanic and Atmospheric Administration's National Marine Fisheries Services (NMFS) to estimate the potential impacts on fisheries resources from entrainment within an open-loop vaporization system. During the development of this EIS and other similar projects in the GOM, USCG and NMFS agreed that evaluation of four species of finfish would represent all of the species that are likely to be present in the Project area. In comments on the assessments for the projects that had proposed open-loop vaporization systems, NMFS stated their preference for closed-loop vaporization systems, such as the one proposed by the Applicant. The primary mitigation identified by NMFS for open-loop systems was substitution of a closed-loop system. However, in evaluations for subsequent deepwater port projects that proposed closed-loop vaporization systems, an analysis of the potential impacts using the quantitative methodology was still conducted.

Based on discussions with NMFS and the Florida Fish and Wildlife Conservation Commission (FWC), two additional species were identified for analysis based on the Port location off the coast of Western Florida. Gag grouper (*Mycteroperca microlepis*) was selected as a commercially and recreationally important species in the Project area that is managed under a Federal Fishery Management Plan (FMP). Sheepshead (*Archosargus probatocephalus*) was selected as a species of concern to Florida that is not managed under a Federal FMP. Potential impacts on Spanish sardine (*Sardinella aurita*) were also assessed because of high densities in the Project area. Spanish sardines are an important forage species for many commercially and recreationally important fish in the eastern Gulf of Mexico. Other species

might have EFH in the Project area or occur in the Project area, but these representative species were selected (in cooperation with NMFS) based on economic and ecological importance, availability of life history data, and the similarity to other population types. It is assumed that impacts on other species in the Project area would be similar to impacts on these representative species. An assessment was also done for the FSRU alternatives using an ambient air vaporization (AAV) system. Since both the FSRU and the LNGCs servicing the Port would require engine cooling water, seawater intake for this alternative would be approximately 4.8 times the intake for STL/SRV alternative.

The assessment to fisheries resources indicates that closed-loop vaporization systems would have direct, adverse, minor impacts on biological resources from the impingement or entrainment of marine organisms. When the equivalent yield was compared to the average landings in Florida, the maximum impact on any species (gag grouper) was found to be 0.03 percent. Impacts for the FSRU/AAV alternative would be equivalent to 0.14 percent of the annual average landings in Florida.

Other minor adverse impacts on biological resources that could occur as a result of the operation of the Port include those associated with increases in vessel traffic, noise, marine debris, and port lighting. Increases in vessel traffic could increase the potential for collisions with marine mammals, thereby increasing the occurrence of serious injuries or mortality. Any marine mammal strike would be considered a "take" under the Marine Mammal Protection Act (MMPA). If a threatened or endangered marine mammal were to be struck, it would also be considered a "take" under the Endangered Species Act (ESA). The U.S. Fish and Wildlife Service (USFWS) has consistently upheld that the take of a single Florida manatee would jeopardize the continued existence of the species, and vessel collisions have been identified as a major source of mortality for this species. While it is known that an increase in vessel traffic increases the risk of collision, the probability of that risk cannot be quantified. The proposed pipeline route does not impact any manatee protected areas or designated habitat. Implementation of proposed BMPs, would reduce the possibility of impacts.

Cultural Resources. Offshore construction (e.g., buoy emplacement, flowline and pipeline burial, and barge anchoring) has the potential for direct and indirect adverse impacts on currently unknown properties potentially eligible for listing in the National Register of Historic Places (NRHP). The proposed Port site and pipeline route avoids known cultural resources. The Applicant has developed an unanticipated discoveries plan to protect any cultural resources discovered during construction of the Port and pipeline.

Geological Resources. Minor, direct, adverse impacts from Port and offshore pipeline installation would be expected. Impacts would be localized and short-term. Subsea sediments are the primary geological resource that would be affected by the Project. The Applicant revised the Proposed Pipeline Route to avoid a permitted sand borrow area and minimize the impacts on other mapped potential sand resource areas. Pipeline construction through permitted or potential sand resource areas would impact less than 1 percent of the potential available sand in each of the identified areas. Approximately 50 acres onshore would be temporarily impacted by construction activities in the pipeline ROW. HDD techniques would disturb natural geologic resources where they are employed, but impacts would be limited to the HDD entry and exit locations. No prime farmland would be impacted.

***Marine Areas and Land Use*.** Minor to moderate, direct, adverse, short-term impacts on marine areas are expected from construction of the Port and offshore pipelines. Minor, long-term impacts on commercial fishing, recreational fishing, and boating could occur within the Safety Zone that would be established around the Port. This zone would limit usage of a very small percentage of the GOM for the life of the Port. The proposed Port and pipeline routes would avoid shipping fairways and navigation channels. The onshore pipeline would restrict future construction along the ROW. No direct or indirect, long-term, adverse impacts would be expected from pipeline operations offshore or onshore.

Recreation and Aesthetics. Short- and long-term, minor, adverse impacts on recreational fishing, boating, and other water-dependent uses would result from construction and operation of the Port. Offshore construction of the Port would be visible to recreational boaters, residents, and visitors. The SRVs in transit and when moored to the buoys would be consistent with other marine traffic in the area. Long-term minor impacts on recreational fisheries could result from the limits placed on boaters in the vicinity of the Port. Operation of the Port and associated onshore facilities could have minor, short-term, adverse impacts on local recreational infrastructure. It is anticipated that the affected resources would adapt to prevent any long-term adverse impacts.

Air Quality. Short-term, direct, minor, adverse impacts on air quality would be expected. Construction equipment onshore and offshore would be the primary source of emissions during construction of the Port (e.g., Port installation, pipeline installation, mobile sources, and pipeline testing). Impacts that exceed Federal and state air quality standards would exist for onshore construction activities but the exceedances would be of very short duration and limited to the area immediately surrounding the construction site. Emissions from Port operations, including SRV emissions, would have a long-term, direct, minor, adverse impact on air quality during the life of the Project. The Port would be within 300 km (186 mi) of two Class I areas, the Chassahowitzka National Wildlife Refuge (NWR), at a distance of 150 km (93 mi) and Everglades National Park (NP) at 244 km (152 mi). Impacts on Class I areas would be below Federal Land Management (FLM) guidelines for Class I areas. Predicted criteria pollutant impacts from operations do not exceed USEPA-established significant impact levels. Pipeline maintenance activities would have a minor, direct, adverse impact on air quality.

Noise. Short- and long-term, minor, adverse impacts on the airborne noise environment would occur from Port operations, vessel traffic, and construction activities. Activities that would produce the greatest amount of noise are short-term actions such as mooring buoy anchor installation, pipe-laying, and construction vessel traffic. Noise generated by the Port operations would not affect noise-sensitive receptors onshore due to the distance from the shore. Support vessels would have the potential to affect noise-sensitive receptors onshore. Noise associated with decommissioning of the facility could have short-term, minor, adverse impacts on local ambient airborne noise. Underwater noise impacts would be short-term, minor to major, and adverse. Construction activities that would produce the greatest amount of noise are short-term actions such as mooring buoy anchor installation. The noise produced by driving the anchor piles could result in major impacts on marine resources, but proper use of BMPs and mitigation measures would be designed to limit impacts. Port operations might produce a slight increase in underwater noise from vessel traffic. The use of thrusters by the SRVs during maneuvers to dock at the Port would result in short-term, minor to moderate, adverse impacts on marine resources. Noise impacts on marine mammals are discussed in the Biological Resources discussion.

Socioeconomics. Construction and operation of the Port would have minor, beneficial impacts on socioeconomic resources through increased employment and purchase of goods and services. The onshore fabrication and support-based operations would be conducted at available existing facilities on Port Manatee and would require no new land or displacement of existing land use. Construction of the offshore flowline and pipeline might have a minor, adverse impact on low-income populations if pipeline construction impacted local commercial or recreational fishing. Project impacts related to population, employment, housing, public services, vessel traffic, and shipping would be minor and easily absorbed within the existing Tampa Bay regional resources and socioeconomic infrastructure. Commercial fishing would be temporarily excluded from the vicinity of construction activities for approximately 11 months during construction. The Port would cause permanent loss of approximately 66 acres of benthic substrata. The benthic substrata impacted by the Port are typical for the area and are not protected or unique. Impacts on shellfish would be minor because the proposed facilities do not traverse any known commercial shellfish beds. Impacts on sand resources for beach sand replenishment programs from establishing a buffer zone around the pipeline are expected to be long-term, minor, and adverse.

Additional mapped sand resources exist in the immediate area and the proposed pipeline route would not impact the permitted sand borrow area.

The potential exists for impacts on biological resources from closed-loop vaporization to indirectly affect commercial and recreational fisheries. These potential adverse impacts would occur as long as the Port was operating. In an attempt to quantify the potential impacts, loss of fish was compared to commercial and recreational fishing activities. No major reduction in populations of the commercially and recreationally important species available to the fishing industries is anticipated. Therefore, measurable secondary economic impacts, such as reduced employment in fishing or fishing-related industries, also are not anticipated. Impacts on other fish species are expected to be of a similar magnitude.

Navigation and Transportation. Minor to moderate, short-term, adverse impacts on transportation resources would be expected from construction of the proposed Port and pipeline which would result in impacts from both construction and operational activities. Approximately 1,800 trips to and from shore are anticipated during the 11-month construction period. Port operations would have a minor, adverse, long-term impact on transportation resulting from two supply trips and one daily crew trip per SRV moored at Port Dolphin. Operational activities are anticipated to be approximately 928 trips annually.

Safety. While safety concerns might have minor, long-term, adverse or beneficial impacts on the decisionmaking processes of potential future proposals within the hazard area, there is no direct, short-term or long-term, adverse impact on activities outside the Safety Zone or Area to be Avoided (ATBA). Mitigation measures would be developed to effectively mitigate anticipated hazards to the general public, non-Port structures, and vessels associated with the Port. An Independent Risk Assessment for the Project estimated the maximum thermal radiation distance to be 4,680 m (2.9 mi). Since the Port locations are at least 28 miles from the nearest shoreline, the potential for direct impacts is minor.

Greenhouse Gas Emissions. An increase of greenhouse gas (GHG) emissions from anthropogenic (man-made) sources since the beginning of industrialization has been shown to correlate with an increase in global average temperature. This has led to concerns that the global climate is changing. The concern is that higher levels of GHGs in the atmosphere and the resultant increase in trapped heat results in the phenomenon of global warming. Since natural gas is a fossil fuel, combustion of natural gas contributes to the generation of greenhouse gasses. The Project would import a daily average of 800 MMscfd of natural gas or less than .0004 percent of U.S. consumption in 2005 and 18.6 percent of current Florida natural gas consumption. Estimated national emissions of GHG for the United States in 2004 were 7,133.5 million metric tons carbon dioxide (CO_2) equivalent. Approximately 83.5 percent of these emissions represent CO_2 emissions from combustion of fossil fuels. Estimated emissions of CO_2 from the State of Florida for 2004 were 258 million metric tons, while national emissions for the United States were 5,957 million metric tons. Therefore, the expected GHG emissions from operation of the Port, 0.9 million metric tons of CO_2 equivalent , represent less than 1 percent of the existing GHG for Florida and less than .000126 percent of the existing GHG for the United States.

No Action Alternative

The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the Applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Mitigation and Best Management Practices

The DWPA requires that an Applicant demonstrate that a proposed deepwater port would be constructed and operated using the best available technology, thereby preventing or minimizing adverse impacts on the marine and terrestrial environment. In addition, the Applicant would be required to follow any BMPs, mitigation measures, and recommendations put forth by Federal and state agencies to reduce adverse impacts on the marine and terrestrial environment. No mitigation measures have been identified for recreational resources and transportation.

Additional mitigations are expected to be developed during the approval process of the Port Operations Manual. The license would require the Applicant to comply with all environmental mitigations, standards, and limitations set forth in the environmental permits issued by the regulatory agencies.

Water Resources. The Applicant submitted a National Pollutant Discharge Elimination System (NPDES) permit application for all of the regulated discharges anticipated in association with operations of the Port. This permit is required under conditions of the CWA. If granted, the permit would describe the conditions and mitigation measures required for compliance.

Biological Resources. To minimize potential impacts on protected species such as marine mammals and sea turtles, the following are expected to be conditions of the License, if issued: MMS/NMFS's *Vessel Strike Avoidance and Injured/Dead Species Reporting* would be included in the Port Operations Manual, a waste management plan would be included in the Port Operations Manual, training on the elimination of marine debris for all offshore personnel, monitoring of impacts of the seawater intake on sea turtle prey, and a plan to use ramp-up procedures and mufflers to minimize the impacts of the noise associated with pile driving and vessel thrusters. If the License is approved, specific mitigation measures to minimize impacts on EFH and commercial and recreational fish and lobster stocks would be incorporated into the design and operation of the Port. A condition of any license granted would include an environmental monitoring program developed in consultation with NMFS to include preconstruction/baseline monitoring and operational monitoring aimed at identifying potential impacts and developing procedures to minimize impacts.

Cultural Resources. Avoidance of the identified sites and unidentified anomalies, and adherence to unanticipated discovery procedures and avoidance measures would ensure no adverse impacts on archeological or historical resources.

Geological Resources. Any significant geological hazard encountered during construction of the Port would be avoided. Additional pre-construction hazard surveys would be conducted prior to construction activities.

Air Quality. The SRVs would use only vaporized LNG as fuel for the diesel engines that provide power to the SRVs while they are moored to the buoys. The SRVs would have selective catalytic reduction (SCR) installed on the exhaust stack of the auxiliary boiler that would be used to provide thermal energy for vaporizing the LNG and on the dual-fuel diesel engines used for power generation while the SRVs are moored to the buoys. This significantly reduces the emissions of nitrogen oxide (NO_x). Oxidation catalysts would also be used to reduce the emissions of carbon monoxide (CO) and volatile organic compounds (VOCs). The Applicant would also be required to obtain all applicable and appropriate air quality permits. The License would require all monitoring and compliance requirements associated with the Port's air permits to be met during the operating life of the facility.

Noise. To minimize noise impacts on marine mammals associated with pile driving and other construction activities, machinery would be operated only when necessary and with the use of noise enclosures or mufflers. Port construction and operation would have minor impacts on shore-based receptors. If full pipeline burial depth cannot be achieved, concrete mattresses will be used. No blasting is anticipated.

Socioeconomics. The need for mitigation of socioeconomic impacts for potential losses of commercial and recreational fisheries is not anticipated. The areas that would be affected by the offshore construction, including all areas for the offshore Port and the pipeline route, including all the Safety Zone and pipeline construction buffer areas, would involve only 26.1 of the approximately 400 square miles of Tampa Bay, for a total of 2.6 percent of the area used by commercial fishermen.

FERC Staff Recommendations

If the FERC Commission authorizes the onshore pipeline portion of the Port Dolphin project, the FERC staff recommends that the following measures be included as specific conditions in the Commission's Order (Order). The FERC staff believes that these measures would further mitigate the environmental impacts associated with the construction and operation of the proposed Project. Mitigation measures 1 through 9 that follow are standard conditions typically recommended by the FERC staff for pipeline projects. FERC staff recommendations 10 through 13 are project-specific.

1. Port Dolphin shall follow the construction procedures and mitigation measures described in its application and supplements (including responses to data requests) and as identified in the EIS, unless modified by the Order. Port Dolphin must do the following:
    a. Request any modification to these procedures, measures, or conditions in a filing with the Secretary of the Commission (Secretary).
    b. Justify each modification relative to site-specific conditions.
    c. Explain how that modification provides an equal or greater level of environmental protection than the original measure.
    d. Receive approval in writing from the FERC Director of the Office of Energy Projects (OEP) before using that modification.
2. The Director of OEP has delegated authority to take whatever steps are necessary to ensure the protection of all environmental resources during construction and operation of the project. This authority shall allow the following:

a. The modification of conditions of the Order.

b. The design and implementation of any additional measures deemed necessary (including stop work authority) to ensure continued compliance with the intent of the environmental conditions, as well as the avoidance or mitigation of adverse environmental impacts resulting from project construction and operation.

3. Prior to any construction, Port Dolphin shall file an affirmative statement with the Secretary, certified by a senior company official, that all company personnel, environmental inspectors (EIs), and contractor personnel will be informed of the EI's authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs before becoming involved with construction and restoration activities.

4. The authorized facility locations shall be as shown in the EIS and as supplemented by filed alignment sheets. **As soon as they are available, and before the start of construction**, Port Dolphin shall file with the Secretary any revised detailed survey alignment maps/sheets at a scale not smaller than 1:6,000 with station positions for all facilities approved by the Order. All requests for modifications of environmental conditions of the Order or site-specific clearances must be written and must reference locations designated on these alignment maps/sheets.

   Port Dolphin's exercise of eminent domain authority granted under NGA Section 7(h) in any condemnation proceedings related to the Order must be consistent with these authorized facilities and locations. Port Dolphin's right of eminent domain granted under NGA section 7(h) does not authorize it to increase the size of its natural gas pipeline to accommodate future needs or to acquire a ROW for a pipeline to transport a commodity other than natural gas.

5. Port Dolphin shall file with the Secretary detailed alignment maps/sheets and aerial photographs at a scale not smaller than 1:6,000 identifying all route realignments or facility relocations, and staging areas, pipe storage yards, and other areas that would be used or disturbed and have not been previously identified in filings with the Secretary. Approval for each of these areas must be explicitly requested in writing. For each area, the request must include a description of the existing land use/cover type, and documentation of landowner approval, whether any cultural resources or federally listed threatened or endangered species would be affected, and whether any other environmentally sensitive areas are within or abutting the area. All areas shall be clearly identified on the maps, sheets, and aerial photographs. Each area must be approved in writing by the Director of OEP **before construction in or near that area**.

   This requirement does not apply to extra workspace allowed by the *Upland Erosion Control, Revegetation, and Maintenance Plan,* minor field realignments per landowner needs, and requirements which do not affect other landowners or sensitive environmental areas such as wetlands. Examples of alterations requiring approval include all route realignments and facility location changes resulting from the following:

   a. Implementation of cultural resources mitigation measures

   b. Implementation of endangered, threatened, or special concern species mitigation measures

   c. Recommendations by state regulatory authorities

   d. Agreements with individual landowners that affect other landowners or could affect sensitive environmental areas.

6. **Within 60 days of the acceptance of this certificate and before the start of construction**, Port Dolphin shall file an initial Implementation Plan with the Secretary for review and written approval by the Director of OEP. Port Dolphin must file revisions to the plan as schedules change. The plan shall identify the following:

a. How Port Dolphin will implement the construction procedures and mitigation measures described in its application and supplements (including responses to data requests), those identified in the EIS, and those required by the Order.

b. How Port Dolphin will incorporate these requirements into the contract bid documents, construction contracts (especially penalty clauses and specifications), and construction drawings so that the mitigation required at each site is clear to onsite construction and inspection personnel.

c. The number of EIs assigned per spread, and how the company will ensure that sufficient personnel are available to implement the environmental mitigation.

d. Company personnel, including EIs and contractors, who will receive copies of the appropriate material.

e. The training and instructions Port Dolphin will give to all personnel involved with construction and restoration (initial and refresher training as the project progresses and personnel change), with the opportunity for OEP staff to participate in the training session(s).

f. The company personnel (if known) and specific portion of Port Dolphin's organization having responsibility for compliance.

g. The procedures (including use of contract penalties) Port Dolphin will follow if noncompliance occurs.

h. For each discrete facility, a Gantt or PERT chart (or similar project-scheduling diagram), and dates for the following:

i. The completion of all required surveys and reports

ii. The mitigation training of onsite personnel

iii. The start of construction

iv. The start and completion of restoration.

7. Port Dolphin shall employ at least one EI per construction spread. The EI shall be:

a. Responsible for monitoring and ensuring compliance with all mitigation measures required by the Order and other grants, permits, certificates, or other authorizing documents

b. Responsible for evaluating the construction contractor's implementation of the environmental mitigation measures required in the contract (see condition 5 above) and any other authorizing document

c. Empowered to order correction of acts that violate the environmental conditions of the Order, and any other authorizing document

d. A full-time position, separate from all other activity inspectors

e. Responsible for documenting compliance with the environmental conditions of the Order, as well as any environmental conditions/permit requirements imposed by other Federal, state, or local agencies

f. Responsible for maintaining status reports.

8. Port Dolphin shall file updated status reports with the Secretary, prepared by the EI on a biweekly basis until all construction and restoration activities are complete. On request, these status reports will also be provided to other Federal and state agencies with permitting responsibilities. Status reports shall include the following:

a. The current construction status of the project, work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally sensitive areas

b. A listing of all problems encountered and each instance of noncompliance observed by the EIs during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other Federal, state, or local agencies)

c. Corrective actions implemented in response to all instances of noncompliance, and their cost

d. The effectiveness of all corrective actions implemented

e. A description of any landowner/resident complaints which might relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns

f. Copies of any correspondence received by Port Dolphin from other Federal, state, or local permitting agencies concerning instances of noncompliance.

9. Port Dolphin must receive written authorization from the Director of OEP **before commencing service of the project**. Such authorization will only be granted following a determination that rehabilitation and restoration of the ROW and other areas affected by the Project are proceeding satisfactorily.

10. Port Dolphin shall not begin construction of the onshore portion of the Project until it has filed documentation that all Section 7 consultations with the USFWS regarding the onshore portion of the Project have been completed and Port Dolphin has received written notification from the Director of OEP that construction or use of mitigation may begin.

11. Prior to the start of construction, Port Dolphin shall file for each HDD location the following: (a) the estimated number of days of drilling required for each location, and whether drilling would be done 24 hours per day; and (b) a description of any noise mitigation which would be implemented during drilling activity to reduce noise impacts at the noise-sensitive areas below 55 A-weighted decibels (dBA) L_{dn}, or 10 dBA over background if ambient levels are above 55 dBA L_{dn}.

12. Port Dolphin shall not begin construction and use of the onshore facilities and staging, storage, and temporary work areas until Port Dolphin consults the Florida State Historic Preservation Officer (SHPO) regarding the need for survey of any newly identified pullouts, staging areas, and extra work spaces; and files the SHPO's comments, any required survey report(s), and the SHPO's comments on the reports. All material filed with the Commission containing location, character, and ownership information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering as follows: **"CONTAINS PRIVILEGED INFORMATION--DO NOT RELEASE."**

Cumulative Impacts

Several cumulative impacts would occur upon implementation of the Project. Most would arise in connection with other OCS activities. Several reasonably foreseeable future actions were identified in Tampa Bay and the GOM. Long-term impacts from Port operations on water quality, socioeconomics, recreation, transportation, and risk management (safety) would be localized. Some long-term, minor, adverse, cumulative impacts on biological resources, including marine mammals, sea turtles, fisheries resources, and EFH, could be associated with operation of the Port.

Water Quality. Marine water quality would be minimally affected by Port construction activities, and no incremental impacts on water quality would occur. Port fabrication activities and the discharges resulting from those activities would occur at existing fabrication facilities and would not be expected to result in any exceedances of permit effluent limitations. Since fabrication activities are not expected to occur at the same time or in the same locations as component fabrication for other Ports, no cumulative impacts would be expected. Therefore, only minor cumulative impacts on coastal water quality, within the limitations of the existing water quality permit, would be expected. Processed bilge water and treated sanitary water discharges from vessels would occur on an intermittent basis, while engine cooling water discharges would occur continuously. Port discharges would only produce minor incremental cumulative impacts on marine and coastal water quality and, if discharged in compliance with an approved NPDES permit, would produce only minor, localized changes to ambient marine water quality. No sodium hypochlorite treatment for cooling water is planned. Dredging and trenching operations required for pipeline installation would not interact with the construction activities for other LNG projects because they would not occur at the same time. Suspended sediments would remain in the water column for a period of time (i.e., hours to days) depending on the size of the sediments. Coarser sediments would fall out and resettle quickly (i.e., hours), while finer sediments could remain suspended for longer periods of time (i.e., days).

Biological Resources. The Port could interact with other OCS activities to produce long-term, adverse, cumulative impacts on biological resources. Marine mammals are and have been severely impacted by an increase in vessel traffic, turbidity, marine debris, and water quality degradation from waste discharges. Sea turtles and manatees are and have been impacted by vessel traffic, turbidity, an increase in marine debris, and a general increase in water quality degradation from waste discharges. Coastal and marine birds are and have been impacted by an increase in marine debris and a disturbance of nesting and foraging areas resulting from onshore construction. Benthic communities currently are and have been impacted by construction and installation of OCS pipelines, fishing, and vessel anchoring. The adverse impacts on these resources from construction and operation of the proposed Port are expected to be minor. Cumulative impacts from vessel traffic are indeterminant since there is currently no method of correlating vessel traffic with potential for ship strikes on marine mammals, sea turtles, or manatees. Further evaluation is being conducted to determine if correlations can be made and impacts more directly assessed.

For all future deepwater port licenses issued, the Maritime Administration could require the Applicant to develop and implement a *Prevention, Monitoring, and Mitigation Plan* to mitigate impacts on marine fisheries species, including meroplankton (organisms that spend part of their life cycle, usually the larval or egg stages, as plankton). Mitigation efforts would also extend to other marine fisheries species when, in the judgment of the Maritime Administrator and after consultation with NMFS, the monitoring program has identified adverse impacts. At this time, mitigation has not been fully developed and therefore, the effectiveness of that mitigation is uncertain.

Cultural Resources. The Port would be constructed to avoid impacts on cultural resources that are listed or eligible for listing in the NRHP. An unanticipated discoveries plan and an avoidance plan have been developed to protect cultural resources during construction. Implementation of the plans is necessary to avoid adverse direct, indirect, or cumulative impacts on cultural resources listed or eligible for listing in the NRHP. If these avoidance efforts were successful, there would be no adverse direct, indirect, or cumulative impacts on cultural resources listed or eligible for listing in the NRHP.

Geological Resources. Communities in the Tampa Bay area use sand resources found in Tampa Bay to renourish local beach fronts. The Proposed Action traverses potential sand resources that could be used for renourishment projects. The Gulfstream Pipeline was installed in an area that might have contained potential sand resources that were not identified at the time of construction. Because the area impacted by

the pipeline buffer is a small percentage of the mapped sand resources, only minor, adverse, cumulative impacts are expected.

Marine Areas and Land Use. Minor, adverse, localized, cumulative impacts on marine or land areas are anticipated. A Safety Zone would extend 850 m from the buoy when a ship is at the Port. This Safety Zone would limit recreational and commercial fishing traffic through the area. The USCG, in consultation with Captain of the Port, Tampa, would likely restrict anchoring near the Port at any time by establishing a No Anchor Area (NAA).

Recreation and Aesthetics. A minor, short-term, adverse impact on recreational fishing would result from temporary displacement associated with offshore Port and pipeline construction activities. Visual resources might be adversely affected by the temporary presence of pipe-laying vessels. Except for recreational vessels that are in the area of the Port, no cumulative visual impacts are expected. Avoiding Safety Zones would be inconvenient to recreational boaters. These impacts are expected to be minor.

Air Quality. Cumulative impacts on air quality from past and present actions would be expected from offshore emissions from cargo and other vessels and onshore emissions sources from power plants and vehicles. Foreseeable future actions that are anticipated to contribute to cumulative impacts include population growth and coastal development, such as factories, which will eventually lead to more demand on electric power. Construction and operation of the MPEH and BOET LNG Deepwater Ports and associated pipelines would be expected to contribute to minor, adverse, cumulative impacts on air quality. Expansion projects for the Big Bend and Bartow Electric Generating stations included installation of emissions-control equipment and replacement of oil-fired units with natural gas units This contributed to reductions in emissions of NO_x and sulphur dioxide (SO_2), and increases in emissions of CO and VOCs. Modeling results showed minor increases in impacts from these pollutants. Therefore, cumulative air quality impacts are expected to be minor.

Noise. Port operations would be distant from any onshore (human) noise sensitive areas and would have no adverse short-term or long-term impacts on those areas. Increased service vessels would have minor long-term, adverse impacts on onshore noise. The support vessels would operate in areas with existing support services. The long-term, adverse, cumulative impacts from the Port would be negligible relative to the noise from existing shipping traffic in the area.

Socioeconomics and Environmental Justice. Construction and operation of deepwater port projects have the potential to beneficially affect socioeconomic resources in the GOM region through job creation and expenditures on goods and services. Impacts associated with onshore fabrication yards are not expected to be cumulative. Components and SRVs are expected to be fabricated at overseas facilities. As a result, the potential to interact with construction of the other LNG ports or major construction activities to produce a cumulative impact is negligible. Relative to the existing economic activities in the region, the cumulative employment associated with the Project would have a negligible, short-term, beneficial impact on area economies. Because of the minor nature of potential losses to fishery stocks, only minor, indirect, adverse impacts on commercial fishing are expected.

Navigation and Transportation. Transportation increases from the construction and operation of the Port are expected to have moderate impacts on the cumulative traffic that currently uses the Egmont shipping fairway and the Tampa/Hillsborough Bay channel. Approximately 1,800 trips are expected during construction of the Port. Crew and supply vessels that travel in and out of Tampa Bay during the operation of the Port are expected to add minor traffic to the existing traffic patterns.

***Public Safety*.** There are small but potentially significant risks associated with the storage and handling of LNG. However, there is no direct cumulative impact on activities outside of the Safety Zone or ATBA. An Independent Risk Assessment for the Project estimated the maximum thermal radiation distance to be 7,330 m (4.6 mi). Since the Port locations are at least 28 miles from the nearest shoreline, the potential for direct impacts is minor.

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FINAL ENVIRONMENTAL IMPACT STATEMENT ADDRESSING THE PORT DOLPHIN LLC LIQUEFIED NATURAL GAS DEEPWATER PORT LICENSE APPLICATION

VOLUME I: IMPACT ANALYSIS
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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
µg/m^3	micrograms per cubic meter
µPa	Micro Pascals
AAV	Ambient Air Vaporization
ABR	auditory brainstem response
ACHP	Advisory Council on Historic Preservation
AHTS	anchor-handling tug supply
AO	Archeological Occurrence
AP	Aquatic Preserve
APE	area of potential effect
APRS	acoustic position reporting system
AQRV	Air-Quality Related Values
ATBA	Area to be Avoided
ATON	Aids to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BA	Biological Assessment
BACT	Best Available Control Technology
BMP	best management practices
BO	Biological Opinion
BOET	Bienville Offshore Energy Terminal
BP	before present
bscf	billion standard cubic feet
BTA	Best Technology Available
Btu	British thermal units
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAM	Compliance Assurance Monitoring
CBC	Christmas Bird Count
CEMS	continuous emissions monitoring system
CEQ	Council on Environmental Quality
CFD	Cubic feet per day
CFR	Code of Federal Regulations
CH	critical habitat
CH_4	methane
cm	centimeter
cm/s	centimeters per second
CO	carbon monoxide
CO_2	carbon dioxide
COLREGS	International Regulations for Prevention of Collisions at Sea
COMDTINST	Commandant's Instruction
COMPS	Coastal Ocean Monitoring and Prediction System
CORMIX	Cornell Mixing Zone Expert System
COTP	Captain of the Port
CPD	Coastal Programs Division
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DAT	deposition assessment threshold
dB	decibel
dBA	A-weighted decibel
DCS	defense communications system
DF	dual fuel

DGPS	differential global positioning system
DHS	Department of Homeland Security
DMF	Division of Marine Fisheries
DOD	Department of Defense
DOE	Department of Energy
DOI	Department of the Interior
DSM	demand-side management
DSV	direct support vehicle
DWPA	Deepwater Port Act of 1974
EEZ	Exclusive Economic Zone
EFH	essential fish habitat
EI	environmental inspector
EIA	Energy Information Administration
EIS	Environmental Impact Statement
EO	executive order
EPCHC	Environmental Protection Commission of Hillsborough County
ERG	Electroretinography
ESA	Endangered Species Act
ESD	Emergency Shutdown
ESU	Evolutionary Significant Unit
F&G	fire and gas
F.A.C.	Florida Administrative Code
FAAQS	Florida Ambient Air Quality Standards
FAS	Floridan Aquifer System
FCMP	Florida Coastal Management Program
FDEP	Florida Department of Environmental Protection
FDHR	Florida Division of Historic Resources
FDMS	Federal Docket Management System
FDOT	Florida Department of Transportation
FERC	Federal Energy Regulatory Commission
FERP	Florida Environmental Resource Permit
FFMZ	Federal Fishery Management Zone
FGT	Florida Gas Transmission
FLM	Federal Land Manager
FLUCCS	Florida Land Use, Cover, and Forms Classification System
FM	feet marker
FMC	Fishery Management Council
FMP	Fishery Management Plan
FMRI	Florida Marine Research Institute
FMSF	Florida Master Site File
FMV	Fair Market Value
FNAI	Florida Natural Areas Inventory
FOSC	Federal On Scene Coordinator
FP	floating platform
FPL	Florida Power and Light Company
FPSC	Florida Public Service Commission
FPSO	floating production, storage, and offloading
FRCC	Florida Reliability Coordinating Council
FSA	Facility/Vessel Security Assessment
FSO	Facility/Vessel Security Officer
FSP	Facility/Vessel Security Plan
FSRU	floating storage and regasification unit

ft/s	feet per second
FWC	Florida Fish and Wildlife Conservation Commission
FY	Fiscal Year
g/ha-yr	grams per hectare per year
gal	Gallon
GAO	Government Accountability Office
GBS	gravity-based structure
GHG	greenhouse gas
GIS	Geographical information system
GMFMC	GOM Fishery Management Council
GOM	Gulf of Mexico
GOMESA	Gulf of Mexico Energy Security Act
GPD	gallons per day
gpm	gallons per minute
GPS	Global Positioning System
HAP	Hazardous Air Pollutant
HAZID	hazards identification
HCA	high consequence area
HDD	horizontal directional drill
hp	horsepower
Hz	Hertz
IAS	Intermediate Aquifer System
ICI	industrial-commercial-institutional
ID	inside diameter
IGC	International Code for Construction and Equipment of Ships Carrying Liquefied Gasses in Bulk
IHA	incidental harassment authority
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
IRA	independent risk assessment
ISPS	International Ship and Port Facility Security
IWAQM	Interagency Workgroup on Air Quality Modeling
JTTF	Joint Terrorism Task Force
kg	kilogram
kHz	Kilohertz
km	kilometer
km/hr	kilometers per hour
km^2	square kilometer
kW/m^2	kilowatts per square meter
kWh	kilowatt hours
LAER/BACT	lowest achievable emissions rate/best available control technology
lb	pound
LFL	lower flammability limit
LNB	low-NO_x burner
LNG	liquefied natural gas
LNGC	liquefied natural gas carrier
LOOP	Louisiana Offshore Oil Port
m	meter
m/s	meters per second
m^2	square meter
m^3	cubic meter
MAFLA	Mississippi, Alabama, and Florida
MAOP	maximum allowable operating pressure
MARPOL	International Convention for the Prevention of Pollution from Ships
mcf	million cubic feet
MD	Management Directive

mg/L	milligram per liter
mg/m^3	milligrams per cubic meter
MGD	million gallons per day
mi	mile
mi^2	square miles
MLLW	mean lower low water
mm	millimeter
MMBtu	million British thermal units
MMBtu/hr	million British thermal units per hour
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
MMscfd	million standard cubic feet per day
MOU	Memorandum of Understanding
MPA	marine protected areas
MPEH	Main Pass Energy Hub™
mph	miles per hour
MPRSA	Marine Protection, Research, and Sanctuaries Act
MRFSS	Marine Recreational Fishery Statistics Survey
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act of 1976
MT/hr	metric tons per hour
MTS	U.S. Marine Transportation System
MTSA	Maritime Transportation Security Act
MW	megawatt
NAA	No Anchoring Area
NAAQS	National Ambient Air Quality Standards
NAIC	North American Industrial Classification
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NGA	Natural Gas Act
NHPA	National Historic Preservation Act
NM	Nautical mile
NMFS	National Marine Fisheries Service
NMS	National Marine Sanctuary
NMSA	National Marine Sanctuaries Act
NNSR	Non-attainment New Source Review
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NODC	National Oceanographic Data Center
NOI	Notice of Intent
NO_x	nitrogen oxide
NP	National Park
NPC	National Petroleum Council
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NPV	Net Present Value
NRHP	National Register of Historic Places
NSA	noise sensitive area
NSPS	New Source Performance Standards
NSR	New Source Review
NTL	Notice to Lessees and Operators
NTU	Nephelometric turbidity unit

NWI	National Wetland Inventory
NWR	National Wildlife Refuge
O_3	ozone
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
ODMDS	Ocean Dredged Material Disposal Site
OEP	Office of Energy Projects
OFW	Outstanding Florida Waters
OPS	Office of Pipeline Safety
ORV	open rack vaporizer
OSHA	Occupational Safety and Health Administration
PA&A	public address and alarm
Pb	lead
PB	St. Petersburg (lease block)
PCB	polychlorinated biphenyl
PHMSA	Pipeline and Hazardous Materials Safety Administration
PLC	Programmable Logic Controllers
PLEM	pipeline end manifold
PM_{10}	particulates equal to or less than 10 microns in diameter
$PM_{2.5}$	particulates equal to or less than 2.5 microns in diameter
ppm	parts per million
ppmvd	parts per million by volume, on a dry basis
ppt	parts per thousand
PSD	Prevention of Significant Deterioration
psi	pounds per square inch
psig	pounds per square inch gauge
PTS	Permanent threshold shift
RACON	radar beacon
RACT	reasonable available control technology
RLNGC	Regasification Liquid Natural Gas Carriers
ROD	Record of Decision
ROI	Region of Influence
ROW	right-of-way
RPT	rapid phase transition
RTD	resistance thermal device
SAFMC	South Atlantic Fishery Management Council
SAS	Surficial Aquifer System
SCR	selective catalytic reduction
SCV	submerged combustion vaporizer
SEAMAP	South East Area Monitoring and Assessment Program
SEARCH	Southeastern Archeological Research, Inc.
SED	Statistics and Economics Division
SHPO	State Historic Preservation Officer
SIGTTO	Society of International Gas Tanker and Terminal Operators
SIL	Significant Impact Level
SIP	State Implementation Plan
SO_2	sulfur dioxide
SOLAS	Safety of Life at Sea
SPCC	Spill Prevention, Control, and Countermeasures
SPL	sound pressure level
SPV	Special Purpose Vessel
SRS	Special Regasification Ship
SRV	shuttle and regasification vessel
STL	submerged turret loading
STSSN	Sea Turtle Stranding and Salvage Network

STV	shell-and-tube vaporizers
SWFWMD	Southwest Florida Water Management District
TBEP	Tampa Bay Estuary Program
tcf	trillion cubic feet
TECO	Tampa Electric Company
TMDL	Total Maximum Daily Load
TMR	triple modular redundancy
tpy	tons per year
TRV	Transfer and Regasification Vessel
TSS	total suspended solids
TTS	temporary threshold shift
U.S.C.	United States Code
UFL	upper flammability limit
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USNOC	U.S. Naval Oceanographic Office
UV/IR	ultraviolet/infrared
VOC	volatile organic compound
VTR	vehicle trip report
yd^3	cubic yards

COMMON CONVERSIONS

Temperature

°F =	°C x 1.8 + 32
°C =	(°F – 32) ÷ 1.8

Length/Distance

1 in =	2.540 cm
1 in =	25.40 mm
1 ft =	0.3048 m
1 m =	3.2808 ft
1 mi =	1.6093 km
1 km =	0.6214 mi
1 NM =	1.15 mi

Volume

1 ft^3 =	0.02832 m^3
1 gal =	0.003785 m^3
1 m^3 =	264.172 gal
1 gal =	0.0238 bbl
1 m^3 =	6.29 bbl
1 MG =	23,800 bbl

Mass

1 g =	0.0022 lb
1 lb =	0.453592 kg
1 kg =	2.205 lb
1 ton =	0.9072 MT

Flow Rate (unit volume per time)

1 bbl/hr =	0.1192 m^3/hr
1 ft^3/s =	0.028316 m^3/s
1 ft^3/s =	448.8 GPM
1 GPD =	0.003785 m^3/day
1 GPM =	0.00379 m^3/min
1 MGD =	0.0438 m^3/s

Velocity

1 ft/s =	0.3048 m/s
1 ft/s =	30.48 cm/s
1 m/s =	1.467 ft/s

Concentration

1 mg/L =	1 ppm (in water)
1 mg/L =	1 x 10^6 µg/m^3

Energy

1 Btu =	2.9308 x 10^{-4} kW-hr

Power

1 kW =	1.340 hp
1 hp =	0.746 kW

Pressure

1 psi =	psig + atmospheric pressure
1 psi =	0.0689476 bar
1µPa =	145 psi

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1. Introduction

1.1 Deepwater Port License Application

On March 29, 2007, Port Dolphin Energy LLC (also referred to as the Applicant or as Port Dolphin) submitted to the U.S. Coast Guard (USCG) and Maritime Administration an application under the Deepwater Port Act of 1974 (DWPA)[1] for all Federal authorizations required for a license to own, construct, and operate a deepwater port off the coast of Florida. On June 15, 2007, USCG notified the Applicant that the application contained sufficient information to continue processing, and on June 25, 2007, the USCG and the Maritime Administration issued a Notice of Application in the *Federal Register* summarizing the application[2]. In December 2007, the Applicant filed an amended application that proposed a new pipeline route intended to avoid sensitive biological resource areas (Port Dolphin 2007b). In December 2008 the Applicant filed a second amendment to the application. The second amendment proposed a new pipeline route intended to avoid sand resource areas used for beach renourishment (Port Dolphin 2008d). The Port Dolphin project, referred herein to as the Project, was assigned Docket No. USCG-2007-28532.

The USCG prepared this Environmental Impact Statement (EIS) to address the potential environmental and socioeconomic impacts associated with the Project. The Maritime Administration is the lead Federal agency responsible for licensing of the deepwater port, which is proposed to consist principally of two unloading buoys for mooring liquefied natural gas (LNG) vessels and a pipeline connecting to two existing onshore natural gas pipelines. In accordance with Section 1504(f) of the DWPA, this EIS has been prepared in cooperation with additional Federal agencies and departments to comply with the requirements of the National Environmental Policy Act of 1969 (NEPA), and such compliance shall fulfill the NEPA responsibilities of such agencies and departments related to the licensing and review of the Port Dolphin project and the requirements of NEPA, the DWPA, USCG Commandant Instruction (COMDTINST) M16475.1D and Department of Homeland Security (DHS) Management Directive (MD) 5100.1, Environmental Planning Program.

Concurrent with their application for the deepwater port, the Applicant submitted an application to the Federal Energy Regulatory Commission (FERC) for a Certificate of Public Convenience and Necessity (Certificate) under Section 7 of the Natural Gas Act (NGA), as amended, to construct and operate a new natural gas pipeline and ancillary facilities in Florida. FERC is the cooperating Federal agency responsible for the review of the onshore portion of the natural gas pipelines and associated aboveground components. The application was assigned FERC Docket Nos. CP07-191 and -192. FERC issued a Notice of Application in the *Federal Register* for the Proposed Onshore Pipeline on May 9, 2007[3]. After discussions with the Florida Department of Environmental Protection (FDEP), the Applicant made changes to their onshore pipeline route. Subsequently, the Applicant filed an amended application with the FERC. On January 28, 2008, the FERC issued a new Notice of Amendment for the Proposed Onshore Pipeline, which was published in the *Federal Register* on February 4, 2008[4]. The amended application was assigned Docket No. CP07-191-001. FERC also opened an additional scoping period to solicit comments on the proposed revisions to the onshore pipeline route (see **Section 1.5**). In January 2009, the Applicant filed supplemental information with the FERC that modified details of the construction of the onshore pipeline. Port Dolphin Energy LLC also filed applications with the U.S. Army Corps of Engineers (USACE) for Department of the Army permits pursuant to Section 10 of the

[1] Public Law (P.L.) 93-627, Sec. 3, January 3, 1975, 88 Stat. 2127, as amended, codified to 33 U.S.C. 1501–1524.
[2] 72 FR 121, pp. 34741–2.
[3] 72 FR 94, pp. 27552–3.
[4] 73 FR 23, pp. 6497–8.

Rivers and Harbors Act of 1899 (33 United States Code [U.S.C.] 403) and Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344). USACE evaluates permit applications for essentially all construction activities, including pipeline and anchor construction, that occur in the Nation's waters, including wetlands associated with the Proposed Onshore Pipeline. USACE permits are also necessary for any work, including construction and dredging in navigable waters. The USACE will issue a joint public notice on the proposed permits. Port Dolphin Energy LLC also filed its applications for coverage under the Clean Air Act (CAA) and CWA with the U.S. Environmental Protection Agency (USEPA). This EIS is the supporting document for FERC's certification under the NGA, USACE's permit decisions related to Section 10 of the Rivers and Harbors Act and Section 404 of the CWA, and USEPA's permits and consultations under the CWA and CAA.

The DWPA establishes a licensing system for ownership, construction, and operation of deepwater ports in waters beyond the territorial limits of the United States. Originally, the DWPA promoted the construction and operation of deepwater ports as a safe and effective means of importing oil into the United States and transporting oil from the Outer Continental Shelf (OCS), while minimizing tanker traffic and associated risks close to shore. The Maritime Transportation Security Act of 2002 amended the definition of "deepwater port" to include facilities for the importation of natural gas[5].

LNG is natural gas that has been cooled to about minus 260 degrees Fahrenheit (°F) (-162.2 degrees Celsius [°C]) for efficient shipment and storage as a liquid. LNG is more compact than the gaseous equivalent, with a volumetric differential of about 610 to 1. LNG can be transported long distances across oceans using specially designed ships, thus allowing access to stranded reserves of natural gas that cannot be transported by conventional pipelines. For several years there were only four onshore LNG import terminals in the United States with these terminals located at Everett, Massachusetts; Cove Point, Maryland; Elba Island, Georgia; and, Lake Charles, Louisiana. All were built between 1971 and 1982. More recently the Gulf Gateway offshore LNG deepwater port in the Gulf of Mexico (GOM) received its first LNG cargo in 2005. In 2008, three new LNG import terminals became operational; two onshore terminals in Texas, (Freeport LNG and Sabine Pass LNG) and an offshore terminal in Massachusetts Bay (Northeast Gateway). All of the new terminals have received limited shipments of LNG to date. In 2001, LNG imports into the United States totaled about 238 billion standard cubic feet (bscf) (7 billion cubic meters [m^3]). In 2005 LNG imports into the United States had grown to about 631 bscf (17.9 billion m^3), but in 2006 import volume had fallen to about 520 bscf (14.72 billion m^3), and fell further in 2008 to 310 bscf (8.77 billion m^3) due to competition for LNG supplies throughout the world (EIA 2009a).

Under the DWPA, all deepwater ports must be licensed by the Secretary of Transportation (Secretary). On June 18, 2003, the Secretary delegated authority to the Maritime Administrator to issue, transfer, amend, or reinstate a license for the construction and operation of a deepwater port[6]. Hereafter, "the Administrator" refers to the Maritime Administrator's actions and responsibilities as the delegated representative of the Secretary. The USCG is preparing the EIS in coordination with the Maritime Administration although USCG is now part of the DHS[7]. The DWPA requires a license applicant to submit detailed plans for its facility.

Port Dolphin (the Port) would be located approximately 45 kilometers (km) (28 miles [mi]) offshore from Tampa, Florida. The Port would be capable of mooring two LNG carriers (LNGCs), referred to as shuttle

[5] P.L. 107-295, Section 106, November 25, 2002, 116 Stat. 2064.

[6] 68 FR 36496–97.

[7] Title XV (Transition) of the Homeland Security Act provides that "pending matters," including license applications currently being processed, will continue regardless of the transfer of USCG from the U.S. Department of Transportation (USDOT). Even though the function of processing applications has been transferred with USCG to the U.S. Department of Homeland Security, the Secretary of Transportation retains ultimate authority to issue, transfer, amend, or reinstate licenses under the Deepwater Port Act.

and regasification vessels (SRVs), by means of a submerged unloading buoy system. Each of two unloading buoys, also known as submerged turret loading (STL) buoys, would have eight mooring lines connected to eight pile-driven anchor points in the seafloor. An SRV would typically moor at the deepwater port for 4 to 8 days. When not connected to an SRV, the STL buoy would be submerged approximately 18.3 to 21.3 meters (m) (60 to 70 feet) below the sea surface and be supported by mooring lines and rest on the STL buoy landing pad. A marker buoy and retrieval line would be used to locate and recover the STL buoy as an SRV arrives at the deepwater port. The unloading buoy would be retrieved from its submerged position and hoisted in through a moon-pool in the forward part of the SRV where it would be positioned in a receiving cone within the hull trunk. After the buoy is locked in position, unloading of LNG would begin.

The SRVs proposed for use by the Applicant would be equipped to transport, store, vaporize, and meter natural gas. A closed-loop, glycol/water-brine heat transfer system would be used to vaporize the LNG. The deepwater port would have an average throughput capacity of 800 million standard cubic feet per day (MMscfd) and a peak capacity of approximately 1,200 MMscfd. Natural gas flowlines from the Port would connect to a 36-inch gas transmission line. The onshore pipeline would traverse east from the Port Manatee industrial area, turn south to travel along the Highway 41 utility corridor, and then turn east again to end in an industrial area. The transmission line would interconnect with the existing Gulfstream Pipeline interstate natural gas transmission line and the Tampa Electric Company (TECO) system approximately 73.9 km (46 mi) east of the deepwater port through onshore interconnections. Construction of the deepwater port components would be expected to take 11 months, with operations planned to commence in the second quarter of 2011.

1.2 Project Purpose and Need

The purpose of licensing deepwater ports for importing LNG in the OCS is to provide a reliable and timely supply of natural gas that would increase energy diversity while considering impacts on the environment to serve the growing demand for natural gas for residential, industrial, and electric generation within west-central Florida. This requires construction of appropriate facilities for receiving the LNG, revaporizing the LNG to a gaseous state, and interconnecting the facility to the transmission pipelines that can reach appropriate markets within the United States.

The DWPA of 1974, as amended, was passed to promote and regulate the construction and operation of deepwater ports as a safe and effective means of importing oil or natural gas into the United States. The DWPA requires the Administrator to approve, approve with conditions, or deny a deepwater port license application. The Congressional intent expressed in 33 U.S.C. 1501 is as follows:

- "authorize and regulate the location, ownership, construction and operation of deepwater ports in waters beyond the territorial limits of the U.S.
- "provide for the protection of the marine and coastal environment to prevent or minimize any adverse impact that might occur as a consequence of the development of such ports.
- "protect the interests of the U.S. and those of adjacent coastal States in the location, construction, and operation of deepwater ports.
- "protect the rights and responsibilities of the States and communities to regulate growth, determine land use, and otherwise protect the environment in accordance with law.
- "promote the construction and operation of deepwater ports as a safe and effective means of importing oil and natural gas into the U.S. and transporting oil and natural gas from the outer continental shelf while minimizing tanker traffic and the risks attendant thereto.

- "promote oil and natural gas production on the outer continental shelf by affording an economic and safe means of transportation of outer continental shelf oil and natural gas to the U.S. mainland."

The DWPA requires the Administrator to approve, approve with conditions, or deny a deepwater port license application. In reaching this decision, the Administrator must consider the nine requirements set forth in 33 U.S.C. §1503(c), as follows:

- The Applicant is financially responsible and will meet the requirements of the DWPA.
- The Applicant can and will comply with applicable laws, regulations, and license conditions.
- Construction and operation of the deepwater port will be in the national interest and consistent with national security and other national policy goals and objectives, including energy sufficiency and environmental quality.
- The deepwater port will not unreasonably interfere with international navigation or other reasonable uses of the high seas, as defined by treaty, convention, or customary international law.
- The Applicant has demonstrated that the deepwater port will be constructed and operated using best available technology, so as to prevent or minimize adverse impact on the marine environment.
- The Administrator has not been informed, within 45 days of the last public hearing on a proposed license for a designated application area, by the Administrator of the USEPA that the deepwater port will not conform with all applicable provisions of the CAA, as amended (42 U.S.C. 7401 et seq.); the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq.); or the Marine Protection, Research and Sanctuaries Act, as amended (16 U.S.C. 1431 et seq., 1447 et seq.; 33 U.S.C. 1401 et seq., 2801 et seq.).
- The Administrator has consulted with the Secretaries of the Army, State, and Defense to determine their views on the adequacy of the application, and its effect on programs within their respective jurisdictions.
- The Governor of the adjacent coastal state approves, or is presumed to approve, issuance of the License.
- The adjacent coastal state, the State of Florida, to which the deepwater port is to be directly connected by pipeline, has an approved coastal zone management program pursuant to the Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. 1451 et seq.).

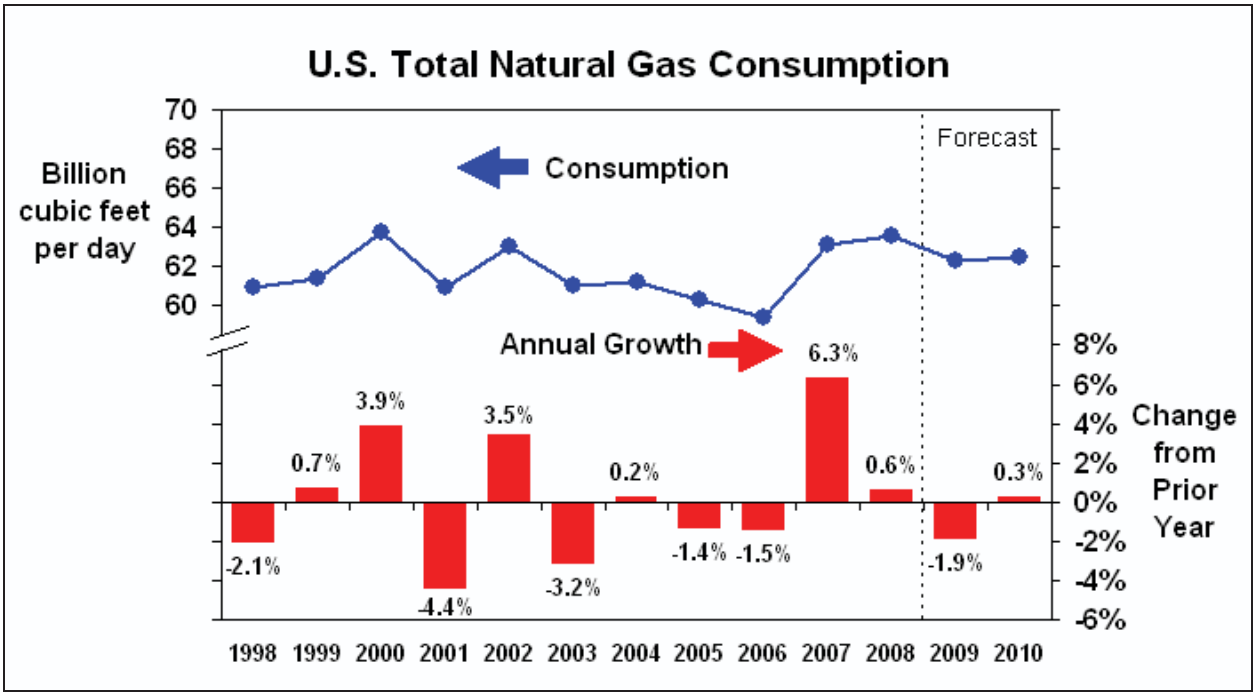
The DWPA application currently under consideration is one proposed by Port Dolphin Energy LLC. In its application, Port Dolphin Energy LLC proposes to construct, own, and operate Port Dolphin to receive and vaporize LNG and transport natural gas at a geographical location that allows it to connect into the west-central Florida natural gas market via the existing natural gas transmission infrastructure.

1.2.1 Increasing Demand for Natural Gas

Energy demand in the United States as a whole has been growing and continues to increase steadily. Part of the intent for the DWPA amendments was to provide mechanisms to ensure that the country's energy market could access worldwide natural gas supplies that the Federal government recognized would become a key supply source for the country's existing and projected natural gas demands over the coming years. However, estimates of the demand for LNG have been changing. In 2007, the U.S. Department of Energy (DOE), Energy Information Administration (EIA) estimated that total energy consumption in the United States will increase 1.1 percent annually, more than 31 quadrillion British thermal units (Btus), or

quads, over the next 20 years, from 100.2 quads per year in 2005 to 131.2 quads per year in 2030 (EIA 2007a). The EIA projected that annual demand for natural gas in the United States could reach 26.1 trillion cubic feet (tcf) by 2030, compared to an annual consumption of 22.0 tcf in 2005, due largely to projected increases in commercial demand and natural gas-fueled electrical power generation (EIA 2007a).

Recent trends in natural gas demand and supply in the contiguous 48 continental states illustrate that demand exceeds supply in 6 of the 13 years, raising concern over the ability to continue to meet projected demand growth regionally and nationally (see **Table 1.2-1**) (EIA 2008a). Although, natural gas demand is expected to fall by 1.9 percent in 2009 due to an expected 2.7 percent decline in the U.S. real gross domestic product (GDP), natural gas demand is expected to increase by 0.3 percent in 2010 due to a projected economic recovery, as shown in **Figure 1.2-1** (EIA 2009c). The EIA Annual Energy Outlook currently provides predictions to 2030. In the 2009 EIA Annual Energy Outlook, natural gas demand is projected to decrease from 23.6 tcf in 2008 to 21.0 tcf in 2015 and increase again to 23.5 tcf by 2030. This prediction is different from the 2007 EIA Annual Energy Outlook's predictions of 25.3 tcf of natural gas demand in 2015 and 26.1 tcf in 2030. Earlier Annual Energy Outlook's predicted even greater levels of natural gas use[8] (see **Figure 1.2-2**). As mentioned above much of the decline in the near future is expected to result from the current worldwide economic decline.



Source: EIA 2009c

Figure 1.2-1. Natural Gas Consumption through 2010

Onshore natural gas production growth is anticipated to come from new sources over the next 20 years. Domestic onshore production in the contiguous 48 states is grouped into six supply regions, which in 2007 ranked from highest to lowest in volume as follows: Gulf Coast, Rocky Mountain, Midcontinent, Southwest, Northeast, and West Coast (EIA 2008a). Projections for 2030 production in the Rocky Mountain region are expected to increase from 24 percent of the contiguous 48 states onshore production

[8] Earlier Additions of the Annual Energy Outlook (pre-2006) provide estimates to 2025.

Table 1.2-1. Annual United States Natural Gas Supply and Demand in the Contiguous 48 Continental States (trillion cubic feet)

Demand	Year													Projected	
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2015	2030
Residential	5.24	4.98	4.52	4.73	5.00	4.77	4.89	5.08	4.88	4.84	4.37	4.72	4.92	4.87	4.93
Commercial [a]	3.16	3.21	3.00	3.04	3.18	3.02	3.14	3.18	3.14	3.06	2.83	3.01	3.12	3.16	3.44
Industrial [b]	9.68	9.71	9.49	9.16	9.40	8.46	8.62	8.27	8.35	7.66	7.62	7.80	7.93	7.96	8.24
Transportation	0.72	0.76	0.64	0.66	0.66	0.64	0.68	0.61	0.59	0.58	0.60	0.64	0.66	0.68	0.79
Electric Power	3.81	4.06	4.59	4.82	5.21	5.34	5.67	5.14	5.46	5.80	6.22	6.87	6.81	6.03	7.01
Total Demand	22.70	22.73	22.25	22.41	23.45	22.24	23.01	22.28	22.43	21.93	21.64	23.04	23.44	22.70	24.41
Total Supply [c]	21.66	21.74	21.54	22.54	23.61	22.12	23.02	22.24	22.10	22.97	22.00	23.15	23.46	22.67	24.37
Net Reserves (Total Supply-Total Demand)	-1.04	-0.99	-0.71	0.13	0.16	-0.12	0.01	-0.04	-0.33	1.04	0.36	0.11	0.02	-0.03	-0.04

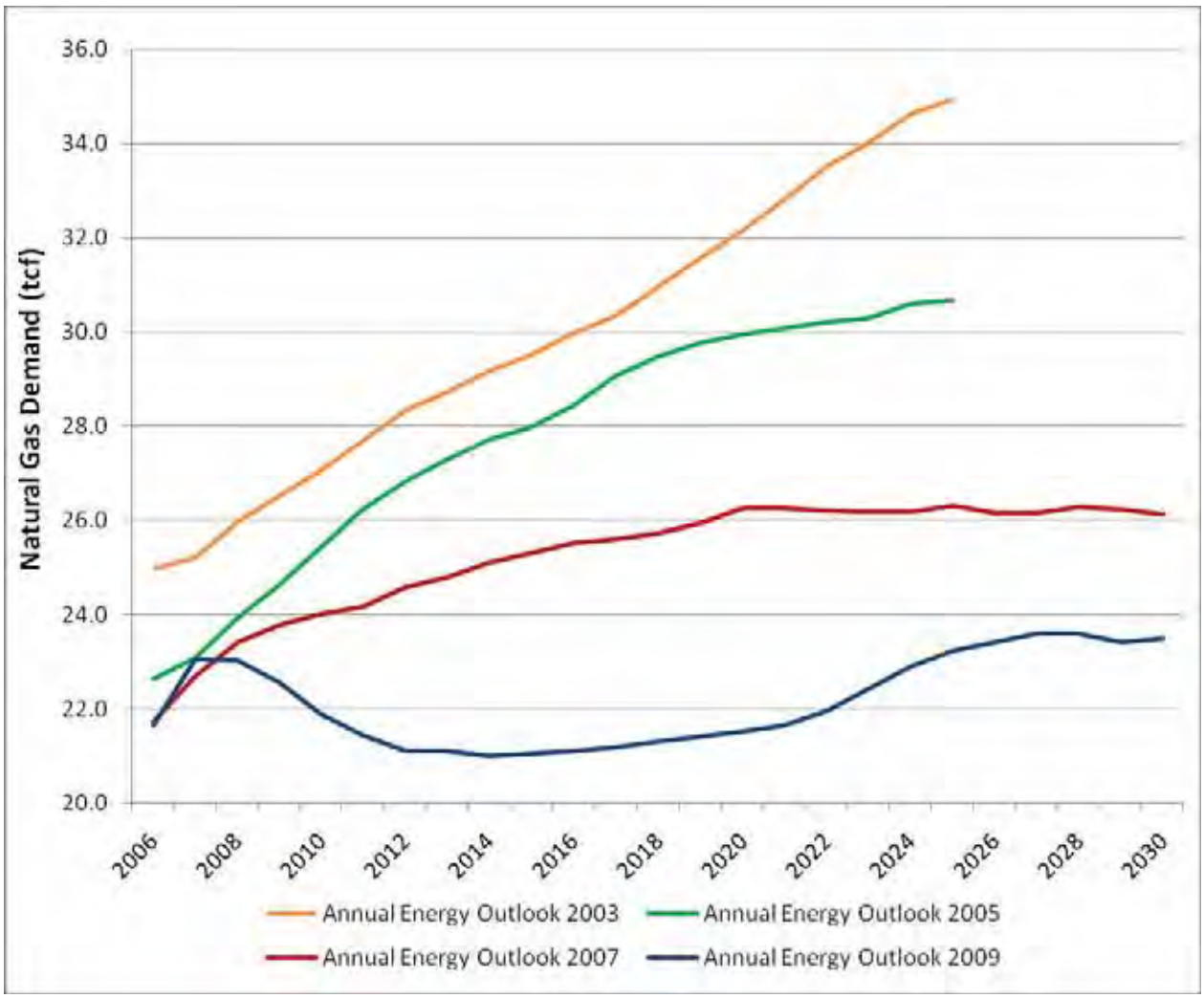
Source: EIA 2008a

Notes:

a. Commercial consumption is gas used by nonmanufacturing establishments or agencies primarily engaged in the sale of goods or services such as hotels, restaurants, wholesale and retail stores, and other service enterprises; and gas used by local, state and Federal agencies engaged in nonmanufacturing activities.

b. Industrial consumption includes natural gas used for heat, power, or chemical feedstock by manufacturing establishments; lease and plant fuel; those engaged in mining or other mineral extraction; and consumers in agriculture, forestry, fisheries, and construction.

c. Total Supply includes total U.S. dry gas production, imports, exports, supplemental gaseous fuels, and working gas in storage.



Source: EIA2003, EIA 2005a, EIA 2007a, EIA 2009a

Figure 1.2-2. Projected Annual Natural Gas Demand

to 29 percent. The Northeast is also expected to increase production from 6 percent of the contiguous 48 states onshore production in 2007 to 11 percent in 2030. These increases are primarily from unconventional sources such as tight sands, shale, and coalbed methane. The Gulf Coast and Midcontinent regions are projected to decrease in production during this time period, and the West Coast and Southwest will increase supply slightly or remain steady.

By 2030, the ranking of regions relative to production is projected to be as follows: Rocky Mountain, Gulf Coast, Southwest, Northeast, Midcontinent, and West Coast. Contiguous 48 states offshore natural gas production is projected to increase. Alaska production is projected to remain steady at current 2007 production levels of 0.4 tcf until 2020, when the North Slope Alaska natural gas pipeline is scheduled to begin operation. Once the planned pipeline begins operation, production of Alaska natural gas will increase fivefold to 2.0 tcf by 2021 with production remaining at this level through 2030 (EIA 2008a).

The GOM accounts for 12 percent of U.S. domestic production. Supply disruptions in the GOM resulting from major hurricanes have demonstrated the short-run vulnerability of the U.S. natural gas market to supply reductions. The severity of the storms and preparedness for the storms directly relates to the supply disruptions and subsequently, price volatility, described in the following paragraph.

According to EIA, Hurricanes Katrina and Rita in 2005 damaged a number of natural gas processing facilities on the Gulf Coast, resulting in reduced operating levels (EIA 2005b). This loss can affect recovery of natural gas production in the area. Even if platforms and pipelines are unaffected or readily restored to service, the gas might not be able to flow to market without treatment. A number of processing plants in Louisiana and Texas, with capacities equal to or greater than 100 MMscfd, experienced long-term production impacts (EIA 2005b). EIA estimates that 21 percent of natural gas production was shut in into 2006 (EIA undated). Loss of natural gas production and supply inevitably equates to increased prices. Estimated average natural gas wellhead prices went from $5.86 per million British thermal units (MMBtu) in May 2005 to $10.68 per MMBtu in October 2005 (EIA 2005b). On November 9, 2005, natural gas prices increased at virtually all market locations in the lower 48 states, with increases exceeding $2 per MMBtu at most markets. In November 2005, prices at most market locations were about $3 to $5 per MMBtu, (about 45 percent to 75 percent) above November 2004 levels (EIA 2005c). Prices at the Henry Hub on November 16, 2005, exceeded November 2004 levels by $4.47 per MMBtu, or about 68 percent (EIA 2005b).

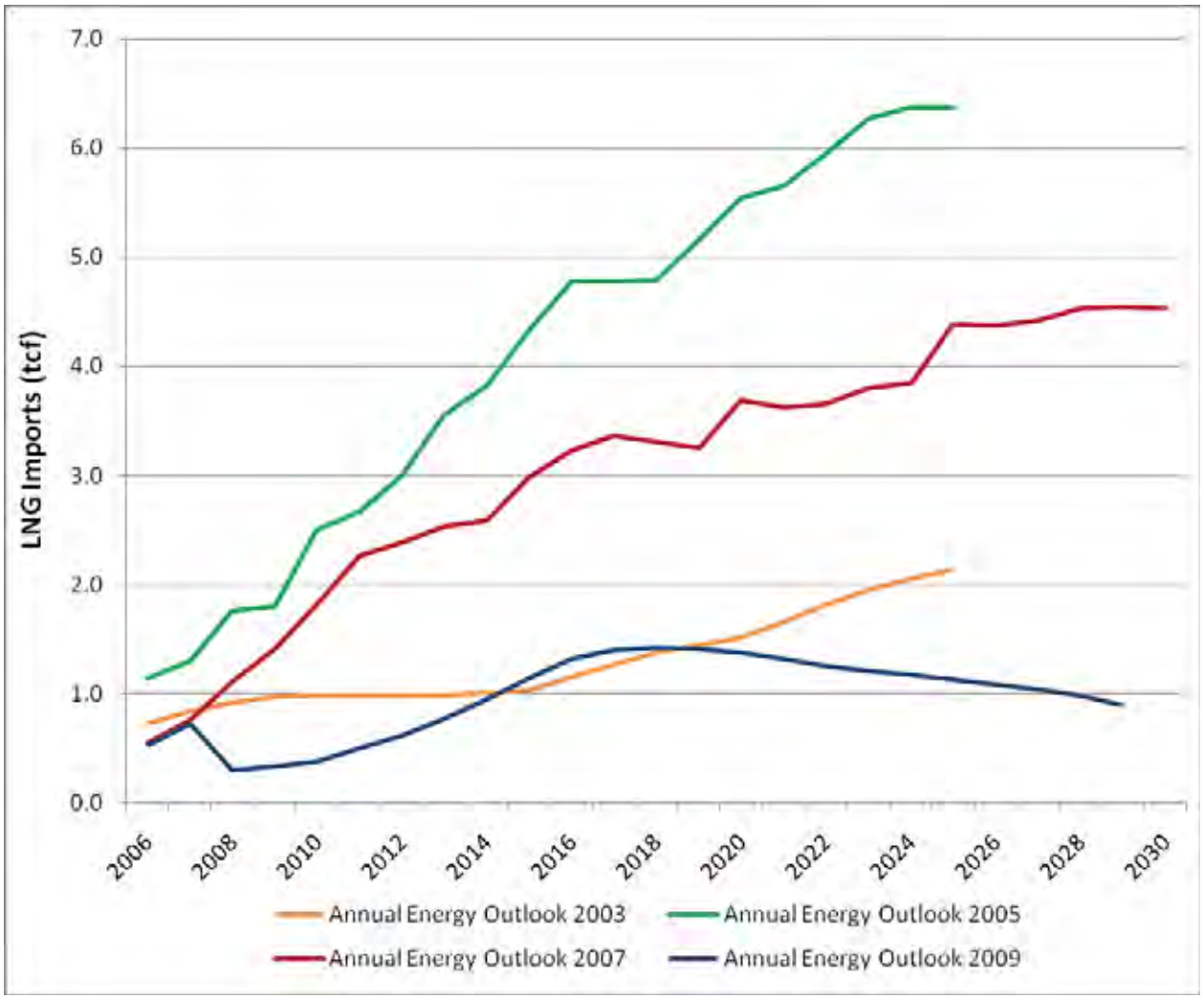
The two major hurricanes during 2008, Hurricanes Gustav and Ike, caused 95 and 98 percent, respectively, of GOM natural gas production to be shut-in. Much of the shut-in was due to evacuation of offshore platforms in anticipation of the storms, although much of the production initially shut-in returned to operation much quicker than in 2005. Unlike the 2005 hurricane season, the 2008 hurricane season did not cause major damage to the GOM infrastructure. For instance, in 2005, 113 platforms were destroyed and 52 damaged with 2 billion cubic feet (bcf) of production permanently offline; whereas, in 2008, 60 platforms were destroyed with no production permanently offline (EIA 2009b).

Henry Hub spot prices, the pricing point at which gas from the GOM is traded on the New York Mercantile Exchange, saw a short-run price increase prior to Hurricane Gustav with prices increasing $0.53 MMBtu to $8.55 on August 20, 2008, or an increase of 6.2 percent over the previous week (EIA 2008a). These increases were not as drastic compared to the 2005 hurricane season where prices increased 18 percent in the week following the hurricanes. There are numerous contributing factors for the marked difference between 2005 and 2008, one of these being the 2008 storms were not as volatile. The other major factor is that in 2005 demand for energy was high and subsequently prices for all energy sources were increasing. In contrast, during 2008, energy markets experienced a decrease in demand and falling prices as a response to worldwide economic decline.

By 2008, the Henry Hub price of natural gas had risen to $9.03 per MMBtu, as a result of higher exploration and development costs and a requirement for increased natural gas production to meet increased consumption while imports are decreasing (EIA 2009a). However, in April 2009, the average price had fallen again to $3.62, and the projected price for May 2009 was $4.02 (EIA 2009c). [This rapid rise and fall of natural gas prices underscores the need for diversity in import locations to prevent natural phenomena, such as hurricanes, from disrupting U.S. LNG input capabilities and to buffer reductions in domestic production.] It also highlights the challenges facing LNG import terminal developers in anticipating future market conditions.

1.2.2 U.S. Demand for LNG

A number of factors have contributed to interest in increasing the level of U.S. imports of LNG, including higher domestic natural gas costs (Gaul and Young 2003). As mentioned, many of the EIA's estimates for natural gas demand have declined recently. A similar trend is exhibited in their predictions for the national demand for LNG imports. In the 2009, Annual Energy Outlook LNG imports were predicted to total 0.8 tcf compared to the predicted 4.53 tcf in the 2007 Annual Energy Outlook. **Figure 1.2-3** shows the increase and decrease of LNG predictions in different editions of EIA's Annual Energy Outlook.



Source: EIA 2003, EIA 2005a, EIA 2007a, EIA 2009a

Figure 1.2-3. Projected Annual LNG Imports

In his June 15, 2006, speech on Energy and the Economy, Federal Reserve Board Chairman Bernanke noted that U.S. production of natural gas was 7 percent below its 2001 level in 2005, "with less than half of that decline reflecting the impact of hurricanes Katrina and Rita." "Between 1988 and 2001, net imports from Canada tripled, but have since flattened out" (Bernanke 2006). At present, about 16 percent of all natural gas consumed in the United States is imported from Canada, but this is expected to drop to 3 percent by 2020 (EIA, 2009a). Both U.S. and Canadian conventional gas fields have matured and are yielding smaller increases in output. Overall, Canadian natural gas production increased only 3 percent between 1999 and 2007, but the number of active wells has increased 102 percent during the same time period (NRC 2009).

Given the diminishing supply of natural gas from the traditional North American sources, LNG provides another alternative to meet the growing demand. As natural gas prices have risen and production and transportation of LNG has become more efficient, imports of LNG have become more economically attractive and can contribute to the overall supply of natural gas. However, offsetting the reduced output from conventional domestic natural gas sources is increasing production of gas from unconventional domestic natural gas sources, especially tight sand and shale deposits. Technological improvements in

drilling these resources are expected to increase production from 1.2 tcf in 2007 to 4.2 tcf in 2030; compensating for the decline in Canadian imports (EIA 2008a).

Recent declines in U.S. economic activity and the potential development of unconventional natural gas deposits, as noted above, could reduce the attractiveness of LNG imports as domestic supply can be met with lower cost domestic alternatives. "Stranded" reserves of natural gas in producing areas of the world can be used to increase the supply of gas in the United States. For these supplies to reach the United States, they must be liquefied prior to transport. Specialized transport ships must then carry the LNG to a regasification facility near the final market for the gas. To ensure that the intended purpose of natural gas deepwater ports is encouraged, the DWPA allows the Port to operate under a strategy of "exclusive use," dedicating the entire capacity of the facility for its own purposes without being subject to the requirements of open access or common carriage.

1.3 Florida Natural Gas Market

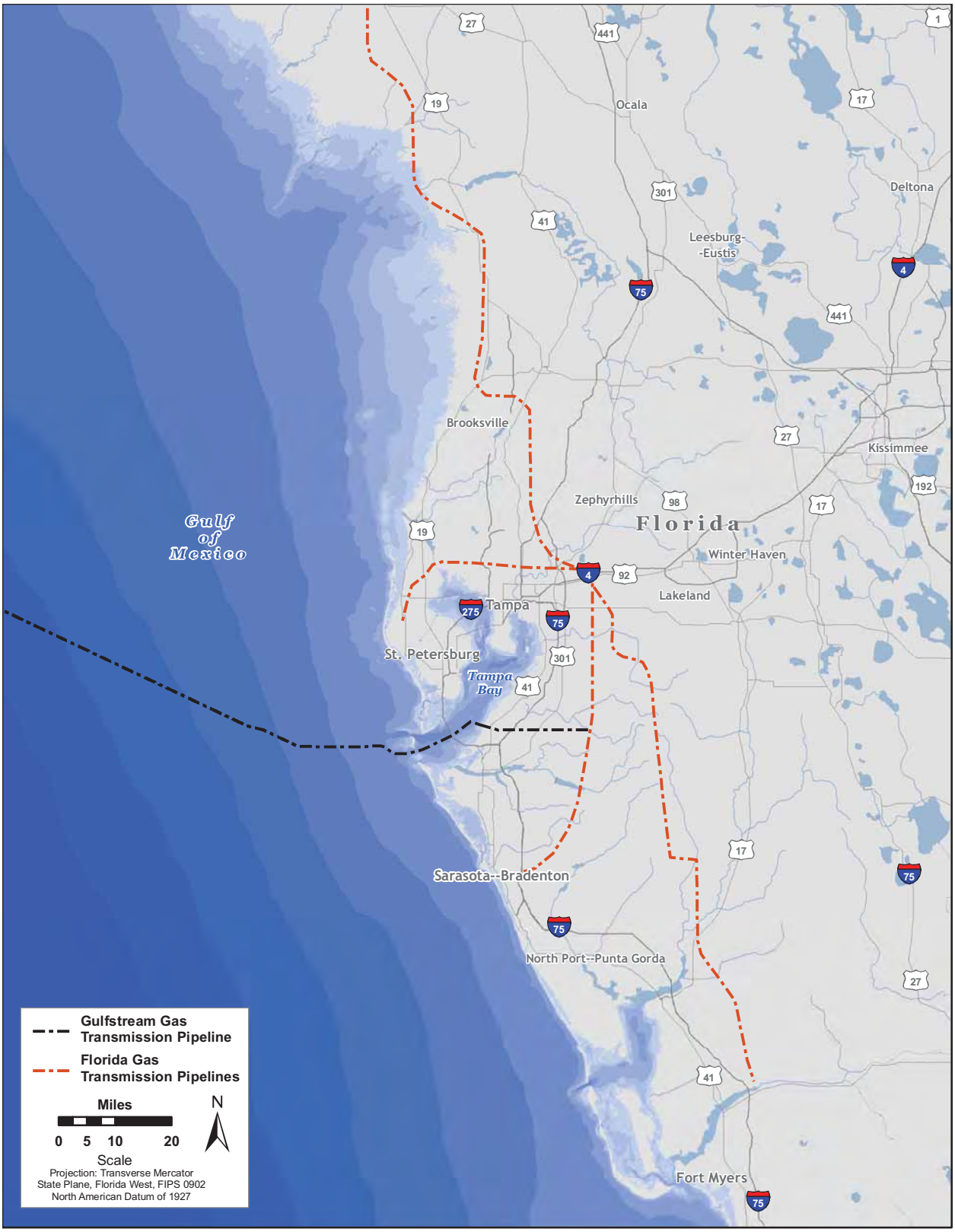
Florida is heavily dependent on natural gas as a source of energy for electricity, home heating, and other uses. Based on future projections, there is a growing demand for additional natural gas in this area; however, this demand cannot be met by the existing domestic supply or by existing natural gas pipelines (see **Figure 1.3-1**).

Based on estimates compiled by DOE, in 2001 the EIA ranked the State of Florida as third nationally in terms of total energy consumption (EIA 2005a). The state ranked 12th nationally in natural gas use in 2001, consuming approximately 543,143 million cubic feet (mcf). By 2007, this consumption rose to 917,245 mcf, raising the state's rank in consumption of natural gas to sixth. This represented a 69 percent increase in natural gas consumption in a 7-year period. The electric generation industry accounted for about 84 percent of the natural gas consumed (EIA 2009d).

The electric generation industry in Florida has an 18-year history in ramping up its use of natural gas. Between 1990 and 2007, the vast majority of new electricity-generating capacity constructed in Florida was natural gas-fired (EIA 2009d). Specifically, in 1990, only about 11 percent of electricity generated in Florida was from the firing of natural gas (FPSC 2005). By 2007, the industry's reliance on natural gas as a fuel source had increased to nearly 39 percent. Moreover, natural gas is projected to compose 54 percent of total energy generated in Florida by 2017 (FPSC 2008).

The need for electricity in Florida is driven largely because the state (1) is a popular tourist destination attracting nearly 80 million tourists annually, and (2) has one of the fastest rates of population growth in the United States. Between 1990 and 2000, the state's population increased by nearly 24 percent (FLOEDR 2008). Since the 2000 Census, the state has grown by 2.8 million persons (an increase of 19 percent). Net migration is the principal reason for the phenomenal growth rate that has occurred in Florida since the 1970s. By 2030, total resident population in the state is projected to exceed 26.4 million or a 47 percent increase over the 2000 Census population. This dramatic projected increase in resident population, coupled with the needs of tourism and industry, will impose a substantial demand on Florida's existing and future energy supply, particularly natural gas supplies and the natural gas transmission system.

Florida's natural gas supply is predominantly obtained from wellheads in the GOM off Texas and Louisiana and transported to Florida's consumers primarily via two pipelines: the Florida Gas Transmission (FGT) System and the Gulfstream Natural Gas System. In recent years, the wellheads in the GOM and onshore processing facilities suffered significant damage as a result of Hurricanes Ivan, Katrina, and Rita. In the wake of Hurricane Katrina, the Florida Reliability Coordinating Council's



Source of Pipelines: ConShelf 2007.

Figure 1.3-1. Existing Natural Gas Transmission Pipelines Serving West-Central Florida

(FRCC) State Capacity Emergency Coordinator issued a Generating Capacity Alert warning of the uncertainty of restoration of natural supplies from the GOM. On January 10, 2006, the EIA reported that nearly 20 percent of natural gas production remained shut-in during the aftermath of Hurricanes Katrina and Rita (EIA 2006a). In addition, approximately 100 oil and gas platforms in Federal waters remained out of service for extended periods and full recovery of oil and natural gas production along the Gulf Coast was not expected until summer 2006 (FDEP 2006a). This further underscores the need for diversified sources of natural gas supplies for Florida consumers.

In recognition of Florida's substantial energy needs and in light of the potential impact that fluctuations in the energy supply could have on the state's economy, former Governor Jeb Bush signed Executive Order (EO) Number 00-127 in May 2000. This EO established the Florida Energy 2020 Study Commission. The commission was charged with determining the extent of Florida's electric energy needs by 2020 and developing a strategy for supplying those needs in an "efficient, affordable, and reliable manner that will ensure adequate electric reserves" (Florida Executive Order 00-127, 2000). The Florida Energy 2020 Study Commission published its strategy in December 2001. The report, entitled *Florida…Energy Wise! A Strategy for Florida's Energy Future*, acknowledged that Florida possesses limited native fuel resources and expressed concern regarding the state's increasing dependence on natural gas for electricity generation.

In November 2005, Governor Bush signed EO Number 05-241 directing the FDEP to issue an updated energy strategy for the state. The Florida Energy Plan was released to the public on January 17, 2006. Two recommendations of the plan (#3 and #4) call for ensuring fuel diversity and fuel supply reliability, and facilitating additional fuel delivery mechanisms in Florida for power generation. In response to these calls for energy supply diversification a number of projects were announced, including two large coal-fired electric-generating plants. However, in response to increased local opposition (TEC 2007) and disapproval by state regulators (FPSC 2007), both projects have been cancelled.

As evident from the discussion above, the predominant energy concerns expressed in all the energy assessments and plans developed by the State of Florida in recent years relate to energy security, including the need for fuel diversity and fuel supply reliability. These plans identify the increasing dependency of Florida's electrical-generating utilities on natural gas (particularly given the volatility in its availability and price) and stress the need to return to the practice of balanced fuel supply. However, opposition to coal-fired generation and the long lead time needed to implement a balanced fuel supply will still result in increases in natural gas consumption by utilities between 2005 and 2014. Moreover, the state is extremely dependent on natural gas supplies originating from the GOM, which are mainly transported via two natural gas pipelines. The potential for future disruptions of Florida's economy resulting from hurricane-inflicted damage to either gas field infrastructure or the pipelines is significant. By expanding Florida's natural gas infrastructure, an LNG deepwater port also would provide the state's natural gas markets with fuel supply diversity through global sourcing of LNG. The Port Dolphin project would provide a source of natural gas to western Florida that is independent of both GOM supply disruptions and of the pipeline constraints of the existing interstate pipelines.

1.4 Scope and Organization of the EIS

The Administrator is responsible for complying with a variety of Federal regulations, including NEPA. As such, the purpose of this EIS is to provide an environmental analysis sufficient to support the Administrator's licensing decision; to facilitate a determination of whether the Applicant has demonstrated that the Project would be located, constructed, operated, and decommissioned using the best available technology to prevent or minimize adverse impacts on the environment; and to encourage and facilitate involvement by the public and interested agencies in the environmental review process.

This EIS assesses potential environmental impacts associated with the installation, operation, and decommissioning of the Project. The affected environmental components encompassed by this EIS include water resources, biological resources, cultural resources, geological resources, marine areas and land use, recreation and aesthetics, air quality, noise, socioeconomic resources and environmental justice, and navigation and transportation. The EIS describes the Project and potential alternatives (**Section 2**), the affected environment as it currently exists (**Section 3**), the probable environmental consequences that might result from installation and operation of Port Dolphin (**Section 4**), public safety (**Section 5**), and cumulative and other impacts (**Section 6**). Greenhouse gas emissions are discussed in **Section 7**. A list of preparers and references used in preparing the document are provided in **Sections 8** and **9**, respectively. Volume II contains the appendices, including public comments, records of coordination with Federal and state agencies, applicable laws and EOs, and specific biological information.

The SRVs would be constructed at existing shipyards outside of the United States and would not be restricted to supplying only one port. Therefore, the impacts associated with construction of the SRVs are not included in the scope of this EIS. Where applicable, this EIS also considers safety but does not function as the final safety screening. All aspects of deepwater port safety would be addressed in the Port Operations Manual, which requires USCG approval prior to initiation of port operations. Financial responsibility is being evaluated within the Maritime Administration as a separate analysis and will be considered along with this EIS as part of the final licensing decision.

In developing this EIS, the preparers adhered to the procedural requirements of NEPA; the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] 1500–1508); USCG procedures for implementing NEPA COMDTINST M16475.1D, *National Environmental Policy Act Implementing Procedures and Policy for Considering Environmental Impacts*); the DHS MD 5100.1, Environmental Planning Program; and the USCG's rule for deepwater ports for LNG (33 CFR Parts 148, 149, and 150). The following elaborates on the nature of the characteristics of various impacts:

- Short-term or long-term. These characteristics are determined on a case-by-case basis and do not refer to any rigid time period. In general, short-term impacts are those that would occur only with respect to a particular activity or for a finite period, or only during the time required for installation activities. Long-term impacts are those that are more likely to be persistent and chronic. For instance, air emissions associated with vessels at the deepwater port would occur for 20 years, the estimated useful life of the proposed facilities. Other types of long-term impacts might persist even beyond the Port's authorized operational period.
- Direct or indirect. A direct impact is caused by a proposed action and occurs contemporaneously at or near the location of the action. An indirect impact is caused by a proposed action and might occur later in time or be farther removed in distance but still be a reasonably foreseeable outcome of the action. For example, a direct impact of erosion on a stream might include sediment-laden waters in the vicinity of the action, whereas an indirect impact of the same erosion might lead to lack of spawning and result in lowered reproduction rates of indigenous fish downstream.
- Minor, moderate, or major. These relative terms are used to characterize the magnitude of an impact. Minor impacts are generally those that might be perceptible but, in their context, are not amenable to measurement because of their relatively minor character. Moderate impacts are those that are more perceptible and, typically, more amenable to quantification or measurement. Major impacts are those that, in their context and due to their intensity (severity), have the potential to meet the thresholds for significance set forth in CEQ regulations (40 CFR 1508.27) and, thus, warrant heightened attention and examination for potential means for mitigation to fulfill the requirements of NEPA.

- Adverse or beneficial. An adverse impact is one having adverse, unfavorable, or undesirable outcomes on the man-made or natural environment. A beneficial impact is one having positive outcomes on the man-made or natural environment. A single act might result in adverse impacts on one environmental resource and beneficial impacts on another resource.

1.5 Public Review and Comment

Agency and public participation in the NEPA process promotes open communication between the public and the government and enhances decisionmaking. All persons and organizations having a potential interest in the Administrator's decision whether to grant the License are encouraged to participate in the decisionmaking process.

The USCG and the Maritime Administration initiated the public scoping process on July 12, 2007, with the publication of a Notice of Intent (NOI) to prepare an EIS in the *Federal Register*. The NOI included information on public meetings and informational open houses; requested public comments on the scope of the EIS; and provided information on how the public could submit comments by mail, hand delivery, facsimile, or electronic means[9]. Documents and comments for this project can be found at http://www.regulations.gov. Users can type in the complete docket number, USCG-2007-28532, view all related documents, and submit a comment.

An Interested Party Letter, the NOI published in the *Federal Register*, and a fact sheet describing the Project were sent to approximately 190 Federal, state, and local agency representatives, and other potentially interested parties (see **Appendix A**). As a result of the Applicant's amended application (assigned FERC Docket No. CP07-191-001), the FERC issued a Notice of Limited Scoping for the proposed Port Dolphin project and Request for Comments on Environmental Issues, which was published in the *Federal Register* on February 11, 2008. The Notice indicated that FERC was soliciting input from the public and interested parties and such input would be limited to the proposed onshore pipeline and related facilities (i.e., those under FERC jurisdiction) in Manatee County, Florida. The comment period for scoping closed March 5, 2008. Public comments submitted as part of the scoping process (see **Appendix A**) were considered during the development of this EIS.

A Notice of Availability for the Draft EIS was published in the *Federal Register* on April 18, 2008. The Draft EIS was posted on the Port Dolphin Docket, and more than 200 copies of the Draft EIS were sent to agencies, organizations, and individuals that had expressed interest in reviewing it. An Open House and Public Meeting was held at the Manatee County Convention Center on May 6, 2008, to provide a forum for the public and agencies to obtain information. The meeting was advertised in the *Tampa Tribune* and the *Bradenton Herald*. The Public Meeting was attended by 41 individuals. Comments on the Draft EIS were accepted through June 2, 2008. Two written comments were provided during the Public Meeting. Seven individuals spoke at the public and provided oral comments. A total of 32 comments were received on the USCG Port Dolphin Docket (see **Appendix B**). In total, 34 comments were received during the public review period. All comments on the Draft EIS were considered during the preparation of the Final EIS. **Appendix B** of the EIS includes all materials, including the NOA and other outreach tools used, and all comments on the Draft EIS that are received during the public review period.

1.6 Permits, Approvals, and Regulatory Requirements

The Maritime Administration is responsible for license issuance. The USCG is responsible for processing the application along with the Maritime Administration. Together, they will ensure NEPA compliance,

[9] 70 FR 61151–52.

and compliance with the provisions of numerous Federal and state environmental laws that require consultation with other agencies concerning specific environmental resources. Examples of these include Section 7 of the Endangered Species Act (ESA), the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the Marine Mammal Protection Act (MMPA), Section 106 of the National Historic Preservation Act (NHPA), and Section 307 of the CZMA. Descriptions of the requirements of these laws and their consultation obligations are presented below and, where applicable, in **Sections 3**, **4**, and **6**. In addition, any enforceable conditions imposed as part of an approved DWPA license must be consistent with (but are not limited to) all regulatory requirements under applicable statutes. Information on agency consultation is provided in **Appendix C**.

For its part, the Applicant would be required to obtain and comply with all applicable and appropriate permits, guidelines, and approvals as provided for in the CZMA, CWA, CAA, and any state or local permits such as the Florida Environmental Resource Permit (FERP), for any impacts on coastal resources, wastewater discharges, or regulated air emissions to the environment. It is the Applicant's responsibility to provide the permitting agency with the information necessary to determine the applicable requirements in a timely manner.

Table 1.6-1 lists major Federal and state permits, approvals, and consultations required to construct and operate an LNG deepwater port. **Appendix D** identifies the principal laws and EOs considered by the Administrator in formulating the license decision. Some of these authorities prescribe standards for compliance. Others require that specific planning and management actions are undertaken to protect environmental resources affected by issuance of a deepwater port license. The authorities shown in **Appendix D** are more fully addressed in various sections of the EIS when relevant to particular environmental resources and conditions. Full text of the laws can be accessed at *http://uscode.house.gov/lawrevisioncounsel.shtml.* EOs can be accessed at *http://www.archives.gov/federal-register/executive-orders/disposition.html*.

Provisions of the Endangered Species Act. Section 7 of the ESA states that any project authorized, funded, or conducted by any Federal agency should not "… jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined … to be critical." The Maritime Administration is required to "informally" consult with the U.S. Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration (NOAA), and the National Marine Fisheries Service (NMFS) to determine whether any federally listed or proposed endangered or threatened species or their designated critical habitats occur near the Port. Since it was determined that these species or habitats might be affected by the Project, the Maritime Administration began "informal" consultation with USFWS and NMFS and prepared a Biological Assessment (BA) (see **Appendix E**) to identify the nature and extent of impacts and recommend measures that would avoid or reduce potential impacts on the species. The BA determined that the Project is not likely to adversely affect one or more federally listed species. Therefore, the Maritime Administration has not requested to enter "formal" consultation under Section 7 of the ESA with the USFWS or NMFS. If formal consultation becomes necessary, USFWS or NMFS would issue a Biological Opinion (BO) on the potential for jeopardy. If their opinion is that the Project is not likely to jeopardize any listed species, they may also issue an incidental take statement as an exception to the takings prohibitions in Section 9 of the ESA. Correspondence with the USFWS and NMFS with respect to the ESA is presented in **Appendix C**.

Table 1.6-1. Major Permits, Approvals, and Consultations for Natural Gas Deepwater Ports

Agency	Permit/Approval/Consultation
U.S. Department of Homeland Security, USCG	– License application processing
USDOT, Maritime Administration	– License application processing and license issuance or denial
FERC	– Certificate of Public Convenience and Necessity to construct, install, own, operate, and maintain a pipeline under Section 7(c) of the NGA (15 U.S.C. § 717 (f)(c))
USDOT, Pipeline and Hazardous Material Safety Administration	– Establish and enforce deepwater port pipeline safety regulations for deepwater ports – Consultation on LNG facility design
U.S. Department of the Interior, Minerals Management Service (MMS)	– Advise USCG and the Maritime Administration concerning the potential impacts of DWPA Terminals on OCS lease blocks – Evaluation of Fair Market Value (FMV) and clearance of the Project footprint (including project pipeline rights-of-way [ROWs]); issuance of an MMS Segment Number, clearance letter, or other evidence that the Project does not conflict with planned or existing Outer Continental Shelf Lands Act (OCSLA) regulated facilities or activities – Hazard surveys guidance and coordination – Archeological coordination
U.S. Department of the Interior, USFWS	– Section 7 ESA coordination – Migratory Bird Treaty Act coordination – Coastal Barrier Resources Act coordination
USEPA	– CWA National Pollutant Discharge Elimination System permit (along with FDEP) – Title V CAA permit – CAA Preconstruction permit – CAA General Conformity Determination – CWA Section 403(c) Ocean Discharge Criteria – CWA Section 404 permit and mitigation consultation
U.S. Department of Commerce, NOAA NMFS	– Section 7 ESA coordination – Essential Fish Habitat (EFH) coordination under MSA – MMPA coordination – National Marine Sanctuaries Act (NMSA) Section 304(d) consultation
USACE	– Section 404 CWA permit – Rivers and Harbors Act Section 10 permit
U.S. Department of Defense	– Consultation (review of license application adequacy and views on effects on departmental programs)

Agency	Permit/Approval/Consultation
U.S. Department of State, Bureau of Oceans and International Environmental and Scientific Affairs	– Consultation (review of license application adequacy and views on effects on departmental programs)
Florida Department of State, Division of Historical Resources (State Historic Preservation Officer [SHPO])	– Section 106 NHPA coordination
Office of the Governor, Florida	– Approves, approves with conditions, or denies the license
FDEP, Coastal Management Program	– CZMA Consistency Determination
Florida Fish and Wildlife Conservation Commission (FWC)	– Consultation (protected species)
FDEP, Florida Department of State, Office of Cultural, Historical and Information Programs	– Consultation (NHPA coordination)
FDEP, Water Management District	– Environmental Resource Permit

Provisions of the Magnuson-Stevens Fishery Conservation and Management Act. The MSA, amended by the Sustainable Fisheries Act of 1996, establishes procedures designed to identify, conserve, and enhance essential fish habitat (EFH) for those species regulated under a Federal Fisheries Management Plan. The MSA requires Federal agencies to consult with NMFS on all actions or proposed actions authorized, funded, or undertaken by the agency that might adversely affect EFH. NMFS recommends consolidated EFH consultations with interagency coordination procedures required by other statutes such as NEPA or the ESA (50 CFR 600.920(e)(1)) to reduce duplication and improve efficiency. The mandatory content of an EFH Assessment is detailed in 50 CFR 600.920(e)(3). As part of the consultation process, sections of this EIS serve as the EFH Assessment for the Project. Correspondence with NMFS with respect to the EFH is presented in **Appendix C**.

Provisions of the Marine Mammal Protection Act. Under the authority of the MMPA of 1972 (16 U.S.C. §§ 1361 et seq.), the Secretary of Commerce is responsible for the protection of all marine mammals except walruses, polar bears, sea otters, manatees, and dugongs, which are the responsibility of the Secretary of the Interior. These responsibilities have been delegated to NMFS and the USFWS, respectively.

The MMPA prohibits the "take" of marine mammals, with certain exceptions, in waters under U.S. jurisdiction and by U.S. citizens on the high seas. Under Section 3 of the MMPA, "take" is defined as "harass, hunt, capture, kill, or attempt to harass, hunt, capture or kill any marine mammal." In the 1994 amendments to the MMPA, two levels of "harassment" were defined. "Harassment" is defined as any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild (Level A); or any act that has the potential to disturb a marine mammal or marine mammal stock in the wild by disrupting behavioral patterns, including, migration, breathing, nursing, breeding, feeding, or sheltering (Level B). In cases where U.S. citizens are engaged in activities, other than fishing, that result in "unavoidable" incidental take of marine mammals, the Secretary of Commerce can issue a "small take authorization." The authorization can be issued after notice and opportunity for public comment if the Secretary of Commerce finds negligible impacts. The MMPA requires consultations with NMFS if impacts on marine mammals are unavoidable.

Section 101(a)(5)(A) of the MMPA directs the Secretary of Commerce, upon request, to authorize the unintentional taking of small numbers of marine mammals incidental to activities (other than commercial fishing) when, after notice and opportunity for public comment, the Secretary (1) determines that total takes during a 5-year (or less) period have a negligible impact on the affected species or stock, and (2) prescribes necessary regulations that detail methods of taking and monitoring and requirements for reporting. The MMPA provides that the moratorium on takes may be waived when the affected species or population stock is at its optimum sustainable population and will not be disadvantaged by the authorized takes (i.e., be reduced below its maximum net productivity level). Section 101(a)(5)(A) also specifies that the Secretary has the right to deny permission to take marine mammals if, after notice and opportunity for public comment, the Secretary finds (1) that applicable regulations regarding taking, monitoring, and reporting are not being followed; or (2) that takes are, or might be, having more than a negligible impact on the affected species or stock.

Provisions of the National Historic Preservation Act. Section 106 of the NHPA requires the Maritime Administration to consider the impacts of its undertakings on properties listed on or eligible for listing on the National Register of Historic Places (NRHP), including prehistoric or historic sites, districts, buildings, structures, objects, or properties of traditional religious or cultural importance, and to allow the Advisory Council on Historic Preservation (ACHP) to comment on the undertaking. Consultation with the State Historic Preservation Officer (SHPO) will take place in the event of a potential adverse impact on historic properties as a result of the Project. The Maritime Administration has requested that the Applicant, as a non-Federal party, assist in meeting the Maritime Administration's obligations under Section 106 by preparing the necessary information and analysis as required by ACHP procedures (36 CFR Part 800). The cultural resources sections of this EIS discuss the Section 106 review.

Provisions of the Coastal Zone Management Act. The CZMA calls for the "effective management, beneficial use, protection, and development" of the nation's coastal zone and promotes active state involvement in achieving those goals. To reach those goals, the CZMA requires participating states to develop management programs that demonstrate how these states will meet their obligations and responsibilities in managing their coastal areas. The agency responsible for administering CZMA in the designated adjacent coastal state is the FDEP Coastal Management Program. The Applicant must prepare a consistency certification, finding that its proposed activities would be fully consistent with the enforceable policies of the state's coastal zone management program, and submit it to the state for review.

Provisions of the Marine Protection, Research, and Sanctuaries Act. Under Section 101 of the Marine Protection, Research, and Sanctuaries Act (MPRSA), 33 U.S.C. 1401, no person may transport material from the United States for the purpose of dumping it in ocean waters in the absence of a permit issued by USEPA pursuant to Section 102 of the Act. "Dumping" does not include "construction of any fixed structure or artificial island nor the intentional placement of any device in ocean waters, or on or in the submerged land beneath such waters, for a purpose other than disposal, when such construction or such placement is otherwise regulated by Federal or state law…" Installation of the Project falls within the ambit of this statutory exclusion.

2. Detailed Description of the Project and Alternatives

The Applicant proposes to construct, own, and operate a deepwater port for importation of LNG and send-out of natural gas. Port Dolphin (the Port) would be located approximately 45 km (28 mi) offshore from Tampa, Florida. The Port would be capable of mooring two LNGCs at one time, referred to as SRVs, by means of a submerged unloading buoy system. Each of two unloading buoys, also known as STL buoys, would have eight mooring lines connected to eight pile-driven anchor points in the seafloor. An SRV would typically moor at the deepwater Port for 4 to 8 days. When not connected to an SRV, the STL buoy would be submerged approximately 18.3 to 21.3 m (60 to 70 feet) below the sea surface and be supported by mooring lines and rest on the STL buoy landing pad. A marker buoy and retrieval line would be used to locate and recover the buoy as an SRV arrives at the deepwater Port. The unloading buoy would be retrieved from its submerged position and hoisted in through a moon-pool in the forward part of the SRV where it would be positioned in a receiving cone within the hull trunk. After the buoy is locked in position, unloading of LNG would begin. The SRV would unlock from the receiving cone and leave the Port after the LNG is unloaded.

The SRVs proposed for use by the Applicant would be equipped to transport, store, vaporize, and meter natural gas. A closed-loop, glycol/water-brine heat transfer system would be used to vaporize the LNG. The deepwater Port would have an average throughput capacity of 800 MMscfd and a peak capacity of approximately 1,200 MMscfd. Natural gas flowlines from the Port would connect to a 36-inch gas transmission line. The transmission line would interconnect with the existing Gulfstream Pipeline interstate natural gas transmission line and the TECO system approximately 73.9 km (46 mi) east of the deepwater Port through onshore interconnections. Delivered natural gas would meet interstate pipeline tariff conditions at the point of delivery and would be conditioned as necessary. Construction of the deepwater Port components would be expected to take 11 months, with operations planned to commence in the second quarter of 2011. A detailed description of the Applicant's proposal is included in **Section 2.3**.

This section of the EIS includes the alternatives that have been considered to determine whether they meet the purpose of and need for the Project; are feasible; and provide environmental advantage in comparison with the Proposed Action. Some of these alternatives were identified by the Applicant. Some have been used in similar projects in other locations. This section identifies the alternatives that will be evaluated in more detail in this EIS (including the No Action Alternative), and alternatives that have been eliminated from detailed analysis.

2.1 Alternatives Considered

NEPA requires that any Federal agency proposing a major action (as defined under NEPA) must consider reasonable alternatives to the Proposed Action, including the No Action Alternative. Evaluation of alternatives assists in reducing or avoiding unnecessary impacts by identifying a reasonable range of alternatives and broadens the scope of options to achieve the underlying purpose that the Applicant might or might not have considered. This analysis of alternatives also broadens the scope of options that might be available to reduce or avoid impacts associated with the action as proposed by the Applicant. The Administrator may approve, approve with conditions, or deny an application for a license under the DWPA. Consistent with NEPA, in determining the provisions of the license, the Administrator may also consider alternative means to construct and operate a deepwater port. Alternatives for an LNG deepwater port can extend to matters such as its specific location, port design concepts, methods of construction, technologies for storing and regasifying LNG, and specific routes for transmission of product.

2.1.1 No Action Alternative

The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the License, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the Applicant could withdraw the license application. Any of these actions or the disapproval by any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Screening criteria, described in detail within each alternatives category, are used to determine whether the broad list of alternatives presented in **Section 2.1.3** will be carried forward for detailed analysis in **Section 4** or eliminated from further consideration. For alternatives eliminated from further consideration, the basis of elimination is given. The Administrator has identified potential alternatives to the Project. The following discussion identifies alternatives found to be reasonable, alternatives found not to be reasonable, and, for the latter, the basis for such finding. The alternatives considered are summarized in **Table 2.1-1**.

2.1.2 Offshore vs. Onshore LNG Alternatives

Congress has passed statutes that distribute responsibility for the development of LNG facilities in the United States across different agencies within the Federal government. For offshore LNG facilities, the USCG and Maritime Administration jointly share responsibility for evaluating and processing applications submitted under the DWPA. For onshore facilities, the responsibility lies within the FERC under the NGA. LNG import terminals that are proposed as onshore facilities are projects independent of LNG deepwater ports that are proposed offshore (i.e., they are not mutually exclusive); therefore they are not considered to be alternatives to each other. In addition no onshore LNG facilities exist or are being proposed that target the west-central Florida market. Several onshore facilities have been approved or proposed for other Gulf Coast states. Onshore facilities are discussed under the No Action Alternative, since they could be developed regardless of the outcome of the proposed DWPA application. Other deepwater port projects in the GOM, including Bienville, and Main Pass Energy Hub™ (MPEH) are discussed in **Section 6**, Cumulative and Other Impacts, as foreseeable actions. The number of LNG facilities needed to meet the growing demand in Florida will ultimately be based on market conditions.

Table 2.1-1. Summary of Alternatives Considered

Alternative Concept	Options/Locations (Subsection in Section 2 Discussed)	Evaluated in Detail in Section 4
No Action Alternative		Yes
Energy Sources	Proposed LNG	Yes
	Coal	No
	Oil	No
	Natural Gas	No
	Nuclear	No
	Alternative Energy	No
Deepwater Port Concepts	Gravity-Based Structure	No
	Fixed Platform	No
	Floating Storage and Regasification Unit	Yes
	Proposed Submerged Turret Loading Buoy System	Yes
	Floating Platform	No
	Artificial Island	No
Port Location	North of Tampa Bay	No
	St. Petersburg Area	No
	Tampa Bay Area	Yes
	Sarasota Area	No
	Fort Myers Area	No
Alternative Vaporization Technologies	Closed Loop - Submerged Combustion Vaporizer	No
	Closed Loop – Shell and Tube Vaporizer	Yes
	Open Loop – Open Rack Vaporizer	No
	Open Loop – Shell and Tube Vaporizer	No
	Ambient Air Vaporizer	Yes
Alternative Pipeline Routes	Offshore Northern Route	No
	Offshore Southern Route	Yes
	Offshore Gulfstream Interconnect	Yes
Alternative Anchoring Methods	Embedment Anchors	No
	Drilled and Grouted Anchors	No
	Suction Piles	Yes
	Gravity Anchors	No
Propulsion Alternatives	Turbine Drive	No
	Slow Speed Diesel	No

Alternative Concept	Options/Locations (Subsection in Section 2 Discussed)	Evaluated in Detail in Section 4
Marine Life Exclusion Systems	Aquatic Filter Barrier	No
	Wedgewire Screens	No
Pipeline Construction Methods	Jetting	No
	Plowing	Yes
	Dredging	Yes
	Horizontal Directional Drill	Yes

2.1.3 Offshore Port Design Alternatives

There are six basic deepwater port design concepts that have been developed by industry and are currently considered commercially available for use as an offshore LNG import port: gravity-based structure (GBS); fixed platform-based unit; floating storage and regasification unit (FSRU); STL buoy systems with Special Purpose Vessels (SPV) that transport and vaporize LNG onboard, such as the SRV proposed for this Project; special purpose floating platforms; and man-made islands constructed to house LNG storage and vaporization equipment. All six port concepts include use of subsea natural gas pipelines to transport regasified LNG from the Port to the existing onshore pipeline system.

Although there is some adaptability of design in each of the six concepts, there are inherent features of each that are most compatible with certain environmental conditions. Each design concept was evaluated based on potential environmental impacts, water depth, required seafloor characteristics, and reliability. Environmental impact areas included areas of seafloor disturbance, water use, air emissions, impacts on shore and nearshore areas, and visual impacts. Reliability was evaluated based on weather and wave conditions in the area that could limit the capability of LNGCs to dock with the port, transfer LNG to storage, or vaporize LNG to natural gas using on board systems. The availability of storage at the Port could increase the reliability of the Port in severe weather since LNGCs would not have to dock for vaporization to continue while the stored LNG was processed. Although there are many system design characteristics that affect overall reliability, system design can compensate for reliability issues through over-design and redundancy. Therefore, for the purposes of this alternatives analysis, each port design alternative is considered to be roughly equal in terms of design-based reliability. Screening was limited to weather- and wave-related conditions. A site was not eliminated solely because a single preselected type of port design was found to be unsuitable for conditions present at that site. Likewise, a design was not eliminated prior to considering whether that design would be suitable for the Applicant's proposed location. In addition, a port design or location was not eliminated solely because it would not support the proposed vaporization alternative. **Table 2.1-2** compares the offshore port design alternatives under analysis.

Table 2.1-2. Comparison of Port Type Alternatives

Alternative Deepwater Port Designs – Comparison of Siting and Operational Requirements						
	GBS	**Fixed Platform**	**FSRU**	**Submerged Turret Loading Buoy System**	**Artificial Island**	**Special Purpose Floating Platform**
Proposed or Existing Deepwater Ports	Port Pelican, Gulf Landing, Compass Port, Pearl Crossing, Beacon Port.	Main Pass Energy Hub, Clearwater.	Cabrillo Port	Gulf Gateway, Northeast Gateway, Neptune, Calypso[1], OceanWay Secure Energy, Port Dolphin.	Safe Harbor Energy	Bienville Offshore Energy Terminal.
Fixed or Floating?	Fixed	Fixed	Floating	Floating – Can be single-point or multiple-point	Fixed	Floating
Ancillary Structures or Vessels	Might have separate platforms for regas or personnel.	Might have separate floating or fixed platform for mooring.	No	For regasification, might have permanently moored vessel to receive traditional LNGCs, or special purpose vessels instead of traditional LNGCs.	No	Might have platform or permanently moored floating facility for regas and port operations.
LNG Storage	LNG storage available	Potential storage on platform or in salt dome	LNG storage available	No LNG storage	LNG storage available	No LNG storage
Water Depth Required	60 –100 feet	> 60 feet	>100 feet	>100 feet	60 –100 feet	100 – 500 feet
Topography	Level or gently sloping	Flexible	Flexible	Flexible	Flexible	Flexible
Substrate Characteristics	Substrate capable of supporting fully loaded structure and seismic stability.	Substrate capable of supporting fully loaded platform.	Flexible; only needed for anchorage.	Flexible; only needed for anchorage.	Substrate capable of supporting fully loaded structure and seismic stability.	Flexible; only needed for anchorage.

Alternative Deepwater Port Designs – Comparison of Siting and Operational Requirements						
	GBS	**Fixed Platform**	**FSRU**	**Submerged Turret Loading Buoy System**	**Artificial Island**	**Special Purpose Floating Platform**
Reliability	• Fixed mooring structures provide limited flexibility during extreme weather. • Storage capability allows regas and send-out in extreme weather.	• Fixed mooring structures provide limited flexibility during extreme weather. • If available, storage capability allows regas and send-out in extreme weather.	• Floating structure limited by wave height. • Storage capability available, but regasification would halt if FSRU were moved in extreme weather.	• Floating structure limited by wave height. • Lack of fixed storage means send-out could potentially halt in extreme weather.	• Fixed mooring structures provide limited flexibility during extreme weather. • Storage capability allows regas and send-out in extreme weather.	• Floating structure limited by wave height. • Lack of fixed storage means send-out could potentially halt in extreme weather.
LNG Vaporization Technology Supported	No restrictions	No restrictions	Open-loop technologies are restricted to shell-and-tube vaporizers (STVs) due to constant movement. Ambient air vaporization (AAV) is possible.	Restrictions would be dependent upon the ancillary structure or vessel.	No restrictions	Weight and size restrictions of floating platform preclude closed-loop or AAV technologies. Open-loop technologies are restricted to STV due to constant movement. If regasification equipment is on ancillary structure/vessel, restrictions would be dependent upon the ancillary structure/ vessel.

2.1.3.1 Gravity-Based Structure Design

A GBS consists of a large concrete structure that contains integrated storage tanks and sits on the seafloor. The GBS would be built at an onshore graving dock using well-proven construction methods and then floated, towed to the site, and installed on the seafloor. This port concept has been commonly and successfully used in the offshore oil and gas industry since the 1980s (CEE 2006). The first use as a platform for an LNG import terminal is the Adriatic LNG project in Italy, which was installed in September 2008 and is scheduled to be fully operational in 2009 (Oil & Gas Journal 2008).

Figure 2.1-1. Gravity-Based Structure

Source: USCG and MARAD 2004

LNG could be offloaded from conventional LNGCs, placed in storage tanks, and then vaporized for delivery as natural gas to the onshore market via an undersea pipeline. An example can be seen in **Figure 2.1-1**. Given the expense associated with constructing and operating a GBS, it appears that these facilities are only economically feasible for projects with relatively large LNG storage (e.g., 250,000 to 330,000 m^3) and natural gas send-out volumes (e.g., 800 to 2,000 MMscfd). The Port Pelican and Gulf Landing Projects have been approved to use facilities of this design in the GOM, but Port Pelican was cancelled by the applicant and Gulf Landing has been indefinitely postponed by the applicant. The Compass Port and Beacon Port Projects were proposed to use GBS designs, but the applications have been withdrawn.

Environmental Impacts. Installation of a GBS would result in a large footprint on the seafloor. This loss of seafloor area would generally result in the loss of more benthic and fish habitat than other concept designs, except for an artificial island. A GBS design also can involve substantial coastal impacts (e.g., wetland loss, dredging) because it typically requires construction of a very large graving dock and sufficient nearshore water depths for floating the GBS to deeper water (USCG and MARAD 2005). In addition, because of its maximum depth limitations, use of a GBS in the GOM would tend to impact nearshore areas where sensitive shallow water habitats and fisheries exist, where the majority of recreational boating and fishing activity takes place, and where it creates potential safety and aesthetic concerns. For comparison, the main deck of the SRVs proposed is 14 m (48 feet) above sea level, whereas a GBS structure previously proposed in the GOM would rise 35 m (114 feet) above the ocean surface (USCG and MARAD 2005.) On the other hand, GBS can serve as artificial reefs, providing hard substrate for the development of new encrusting and fouling communities. As has been demonstrated by other permanent offshore oil and gas structures, such facilities have the potential to support significant and diverse fish and shellfish communities.

Reliability. GBSs that are designed for continuous supply of natural gas must have sufficient storage capacity to allow continuous vaporization while LNGCs transit to and from the port. This storage capability allows for the transfer of natural gas to the market even when LNGCs cannot traverse waters in times of severe weather. Therefore, GBS might be more reliable than floating systems in severe weather conditions. However, LNGCs are limited by wave height when docking with the GBS or platform-based port. Generally, LNGCs are limited to 2.0- to 2.5-m (6.6- to 8.2-foot) wave heights when docking.

Conclusion. The GBS option is more sensitive to weather conditions than the proposed STL option. The sensitivity is based on weather effects on mooring and unloading of SRVs. However, based on the

historic weather patterns at the proposed location, the total downtime for any system is limited to a few days at most. Provided that the wave conditions are not so extreme that the vaporization process would have to be shut down, the designs such as GBS that provide onsite LNG storage would be able to continue send-out even if the LNGCs could not dock at the port. If extreme weather required shutdown of vaporization, then it would likely also limit operation of the STL design as well. Therefore, weather-related reliability of the systems is likely to be similar.

The GBS system has higher vulnerability to damage during extreme weather events. As demonstrated during Hurricanes Katrina and Rita, damage to GOM surface facilities can result in system shutdowns that extend longer than the weather event itself. Therefore, the STL design offers reliability advantages. During a weather event the SRV can depart the buoy, the buoy can be safely moored below the surface, and the SRV can return and resume transfer as soon as the storm has passed.

Although a GBS port would have high reliability for continuous delivery of supply, it has several disadvantages from an environmental standpoint because it must be sited in shallow waters, where it presents a source of impact on areas of high marine productivity, potential conflict with nearshore fisheries, proximity to nearshore recreational boating and fishing areas, and a permanent visual obstruction on the horizon. These shortcomings, coupled with high capital and construction costs, make the GBS design less preferable. Therefore, the GBS design is not carried forward for detailed review, and sites suitable for GBS port designs were not considered in the analysis of alternative locations.

2.1.3.2 Fixed Platform-Based Unit

The fixed platform-based unit design would consist of a newly constructed platform or conversion of an existing offshore platform or platforms with docking facilities and LNG unloading arms, storage, and vaporization equipment. Because these platforms are or would be anchored using fixed-tower structures, they could be located in a broader range of water depths than a GBS. Similar to the GBS design, LNG could be unloaded from conventional LNGCs, vaporized at the platform, and sent as natural gas to the onshore market via an undersea pipeline. An example can be seen in **Figure 2.1-2**. Depending on the specific design, the use of an offshore platform might not include offshore storage of LNG. The Clearwater Port project proposal includes using an existing platform as a terminal to import LNG into California from the Clearwater Project, and Freeport-McMoran Energy LLC has recieved a DWPA license for MPEH™ to modify a series of existing connected platforms about 26 km (16 mi) off the coast of southeastern Louisiana to use as a deepwater LNG terminal.

Figure 2.1-2. Fixed Platform-Based Unit

Source: USCG and MARAD 2006

Environmental Impacts. Fixed platform-based units would have adverse impacts on benthic resources from the installation of the platform legs. The number of legs for each platform, the number of platforms required, and the methods used to install the legs would alter the environmental impacts. Platforms would also stand taller and result in greater visual impacts than floating designs.

The platform port designs would be served by conventional LNGCs. Therefore, in addition to the cooling water required for port electric-generating equipment cooling, the LNGCs would also require cooling water for onboard generating equipment and propulsion auxiliaries. An average of three LNGCs per

week would be required to maintain the design send-out rate for the Project. Based on reported cooling water intakes for LNGCs, and assuming that the LNGC would be moored at a port for 24 hours, a total of 57 MGD would be used by the LNGCs for cooling. The Port would require 135 LNGC visits for a total of 7,695 million gallons of cooling water intake per year. In addition, the Port would use 5.5 MGD. Therefore, a total annual cooling water use of 9,702.5 million gallons would be required for GBS system cooling and LNGC water intake, which exceeds the 2,007 million gallons used by the SRV design. For any design, the volume of ballast water intake would be dependent on the volume of LNG vaporized, so all port designs would use approximately the same volume of ballast water (FERC 2008b).

Reliability. GBS, fixed platform-based units, and FSRUs that are designed for continuous supply of natural gas must have sufficient storage capacity to allow continuous vaporization while LNGCs transit to and from the platforms. This storage capability allows for the transfer of natural gas to the market even when LNGCs cannot traverse waters in times of severe weather. Therefore, GBS and other fixed platform-based units might be more reliable than floating systems in severe weather conditions. However, LNGCs are limited by wave height when docking with the GBS or fixed platform-based port. Generally, LNGCs are limited to 2.0- to 2.5-m (6.6- to 8.2-foot) wave heights when docking.

Conclusion. Platform option is more sensitive to weather conditions than the SRV and floating platform (FP) options. The sensitivity is based on weather effects on mooring and unloading of SRVs, as well as the FSRUs processing operations due to LNG sloshing in tanks and other motion-related effects on fluid mechanics. However, based on the historic weather patterns at the proposed location, the total downtime for any system is limited to a few days at most. Provided that the wave conditions are not so extreme that the vaporization process would have to be shut down, the designs that provide onsite LNG storage would be able to continue send-out even if the LNGCs could not dock at the port. If extreme weather required shutdown of vaporization, then it would likely also limit operation of the SRV and FP projects as well. Therefore, weather-related reliability of the systems is likely to be similar for all port designs.

Each of the fixed systems has higher vulnerability to damage during extreme weather events. As demonstrated during Hurricanes Katrina and Rita, damage to GOM surface facilities can result in system shutdowns that extend longer than the weather event itself. Therefore, the SRV and STL design offers reliability advantages. During a weather event the SRV can depart the buoy, the buoy can be safely moored below the surface, and the SRV can return and resume transfer as soon as the storm has passed.

A fixed platform-based unit would require additional platforms to be installed to contain sufficient LNG storage to unload the entire cargo from an LNGC. Therefore, either several platforms would be required, with attendant environmental impacts, or regasification would have to be performed directly as LNG is unloaded from the moored LNGC. If a vessel is unable to moor alongside the fixed structure due to high winds and wave conditions, the throughput could be interrupted. Essentially, a fixed platform-based system has more limited operational ability to moor, connect, and unload LNG compared to an SRV during bad weather conditions. Thus, the level of reliability and continuous throughput required for the commercial viability of the Project might not be achieved using the fixed platform-based system. The environmental impacts of a fixed platform-based unit would be higher than for the SRV, FP, and FSRU designs because of the platform legs that would be set to support the platforms. Therefore, the fixed platform-based design was not carried forward for additional review.

2.1.3.3 Floating Storage and Regasification Unit

An FSRU is a purpose-built floating ship-like vessel without a propulsion system, based on LNGC technology and components of floating production, storage, and offloading (FPSO) systems, which are widely used in the offshore oil and gas production industry. The first unit was installed in Spain in 1977, and more than 50 are operating in locations in Europe, Africa, North America, and Asia (Skipsrevyen 2007). The first FSRU for use as an LNG port was converted from an LNGC by Golar in 2007 and contracted to Petrobras, and an additional four LNGCs are being converted by Golar for service as FSRUs (GlobeNewswire 2006). LNG storage tanks would be integrated within the hull, and regasification and unloading equipment would be on deck. These units would be permanently anchored offshore where conventional LNGCs could dock next to and unload LNG to the FSRU. The FSRU would be connected to an external turret, which would allow high-pressure gas to be sent out through a riser to the subsea pipeline. While the FSRU could be spread-moored (i.e., on a constant heading), a weathervaning turret-mooring would most likely be used, unless a very sheltered location was available. An example can be seen in **Figure 2.1-3**. This design was proposed to import natural gas to markets in California at the Cabrillo Port Project, which was rejected by the Governor of California, and has been proposed in New York at the Broadwater Energy Project.

Figure 2.1-3. Floating Storage and Regasification Unit

Source: USCG and MARAD 2007e

Environmental Impacts. The environmental impacts of the FSRU would depend on the number of anchors installed and the method of installing the anchors. A discussion of impacts due to anchor type is included in **Section 2.1.5**. The number of anchors would be influenced by the size of the vessels, with large vessels requiring larger sizes or numbers of anchors.

Reliability. FSRUs that are designed for continuous supply of natural gas must have sufficient storage capacity to allow continuous vaporization while LNGCs transit to and from the platforms. This storage capability allows for the transfer of natural gas to the market even when LNGCs cannot traverse waters in times of severe weather. FSRUs could be limited by LNG sloshing in the storage tanks in severe wave events. Additionally, LNGCs are limited by wave height when docking with the FSRU. Generally, LNGCs are limited to 2.0- to 2.5-m (6.6- to 8.2-foot) wave heights when docking (FERC 2008b).

Conclusion. The FSRU is more sensitive to weather conditions than the SRV and FP options. The sensitivity is based on weather effects on mooring and unloading of SRVs, as well as the FSRUs processing operations due to LNG sloshing in tanks and other motion-related effects on fluid mechanics. However, based on the historic weather patterns at the proposed location, the total downtime for any system is limited to a few days at most. Provided that the wave conditions are not so extreme that the vaporization process would have to be shut down, the designs that provide onsite LNG storage would be able to continue send-out even if the LNGCs could not dock at the port. If extreme weather required shutdown of vaporization, then it would likely also limit operation of the SRV and FP projects as well. Therefore, weather-related reliability of the systems is likely to be similar for all port designs.

Each of the fixed systems has higher vulnerability to damage during extreme weather events. As demonstrated during Hurricanes Katrina and Rita, damage to GOM surface facilities can result in system

shutdowns that extend longer than the weather event itself. The FSRU is designed to weather storms at the site, but if extreme weather was predicted, it could be towed to a safe location until the storm passed and then returned to operation.

The FSRU design has a small environmental footprint and can be located in deeper water, farther from shore. The FSRU can operate in more extreme sea conditions, and therefore provide greater reliability of service. The FSRU design can support the Applicant's proposed gas send-out rates without additional storage or control platforms.

The FSRU has nearly the same level of environmental impacts as the SRV. Impacts resulting from anchors for the FSRU are likely to be lower because a single set of anchors would be required for the FSRU to support continuous vaporization and send-out of natural gas, while an SRV system would require two sets of anchors to allow simultaneous operation of two SRVs while one is shutting down and the other is starting up. The principal advantage offered by the FSRU design would be the ability to use the ambient air vaporization system discussed in **Section 2.1.7.3**.

Although an SRV and unloading buoy system could be more costly than a conventional LNGC due to the required vaporization and buoy mating systems, the total capital cost of an FSRU system that would meet this Project's supply conditions would likely be larger, mainly due to the increased costs to accommodate floating storage needs. Because the environmental impacts of the anchoring system would be similar to the SRV, the operating parameters would provide similar reliability as the SRV, and the potential for reduced marine impacts through the use of the AAV system, the FSRU design is carried forward for detailed review.

2.1.3.4 Special Purpose Floating Platform

This concept is essentially a hybrid of the submerged buoy concept and the fixed platform-based unit. An FP is held in place by an anchoring system similar to the anchors used for submerged unloading buoys. The FP is designed to dock with conventional LNGCs. Vaporization equipment is housed on the platform, and a small support platform constructed nearby houses personnel facilities and support structures for the floating platform. No LNG storage would be provided by this design. An example can be seen in **Figure 2.1-4**. The Bienville Offshore Energy Terminal (BOET) Project using this concept has been proposed by TORP Technologies for construction in the GOM. In October 2008, the Application for BOET was withdrawn by the Applicant. In public statements, the Applicant for BOET has said that a new application will be filed and a closed-loop vaporization system will be proposed (Energy Current 2008). To date, no additional information has been made available. The Esperanza Project off the coast of Southern California has been announced by Tidelands Oil and Gas, but no application has been filed.

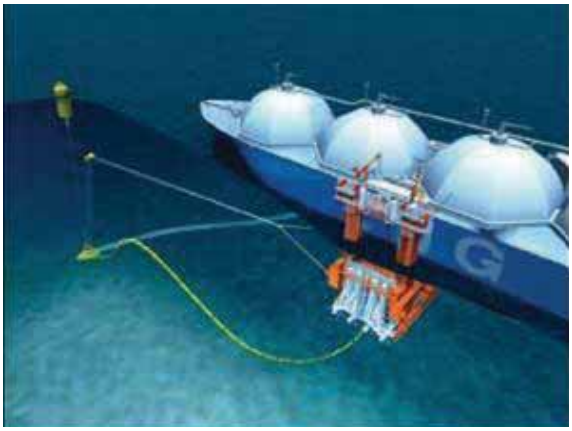


Figure 2.1-4. Special Purpose Floating Platform

Source: USCG and MARAD 2007d

Environmental Impacts. The environmental impacts of floating designs would depend on the number of anchors installed and the method of installing the anchors. A discussion of impacts due to anchor type is included in **Section 2.1.5**. The number of anchors would be influenced by the size of the vessels, with

large vessels requiring larger sizes or numbers of anchors. FPs also require an additional support platform. The FP design includes impacts from both the anchor system and the support platform legs.

Reliability. The FP design provides for docking with a wide range of existing and planned conventional LNGCs. FPs have weather-related characteristics similar to SRVs. Model tests have demonstrated capabilities to dock with LNGCs and to continue offloading operations in seas up to 4.5 m (14 feet) (TORP LNG 2006a, 2006b).

Conclusion. The FP and STL designs have similar sensitivity to weather conditions. The sensitivity is based on weather effects on mooring and unloading of LNGCs and SRVs. If extreme weather required shutdown of vaporization, then it would likely limit operation of both the STL and FP projects. Therefore, weather-related reliability of the systems is likely to be similar.

The FP design has higher vulnerability to damage during extreme weather events because of the associated fixed platform. As demonstrated during Hurricanes Katrina and Rita, damage to GOM surface facilities can result in system shutdowns that extend longer than the weather event itself. Therefore, the STL design offers reliability advantages. During a weather event the SRV can depart the buoy, the buoy can be safely moored below the surface, and the SRV can return and resume transfer as soon as the storm has passed.

The FP design would provide capabilities similar to the SRVs. The existing FP design can only support an open-loop shell-and-tube vaporizer system design. The seawater intake design for the Bienville Project has been redesigned to minimize impacts from the open-loop design. The Esperanza Project proposes to use the cooling water effluent from an onshore power plant as its warming water supply. The closest power plant to the proposed location of Port Dolphin is more than 40 miles away, compared to the 15-mile distance for the Esperanza project. The nearest power plant is also about 15 miles inland compared to the shoreside location of the power plant in California. Therefore, the impacts associated with bringing power plant effluent to the Port Dolphin site would be considerably higher than those associated with Esperanza. Since a support platform would also be required, the FP design would have higher environmental impacts than the SRV design. In addition, because of objections raised by the Governor of Alabama, the adjacent coastal state associated with BOET, the application was withdrawn. Therefore the FP design is not carried forward for detailed review.

2.1.3.5 Artificial Island

An artificial island such as the proposed Safe Harbor Energy Island Terminal near Long Island, New York, would create approximately 60.5 acres in surface area and would require a seafloor footprint of 116 acres. The site would be built using mostly four main components: sand, rock, concrete caissons, and concrete armor units. The interior would be built with sand and the exterior would be built up using a combination of rock and concrete armor units to protect the artificial island from wave attack. An example can be seen in **Figure 2.1-5**.

Figure 2.1-5. Artificial Island

Source: USCG and MARAD 2007d

The artificial island port design would include (1) a rock breakwater structure surrounding the main body of the island to provide a protected harbor for the berthing of LNG tankers and support vessels;

(2) granular fill material (sand and gravel) for the main body of the island would be contained and protected on all sides by a rock breakwater structure; (3) a steel pile-supported pier structure with the unloading facilities and associated mooring dolphins and breasting dolphins that would be capable of securing two LNG tankers for the unloading of LNG cargo; (4) LNG storage tanks constructed on pile supports to contain the LNG; (5) LNG vaporization equipment; (6) facilities required for the docking of the LNG vessels and support of the LNG processing operation including power generation and accommodations for workers; and (7) miscellaneous supporting facilities, such as a sewage treatment system, a storm water collection system, and administration, maintenance, and storage buildings.

Environmental Impacts. Installation of an artificial island would generally result in a much greater loss of benthic and fish habitat, and thus a greater adverse effect on fish and marine communities than other port design alternatives due to its large footprint.

An artificial island port design would require procurement of sand, rock, and concrete, likely from areas outside of the GOM. In addition because its maximum depth limitations would require a location fairly close to shore, use of an artificial island could adversely impact sensitive shallow water habitats and fisheries, as well as recreational boating and fishing activity. Nearshore locations could also create potential safer concerns. Furthermore, as artificial islands are permanent fixed structures that would likely be closer to shore than most other port designs, they would likely result in greater adverse aesthetic impacts if located close enough to shore to be visible. Finally, the environmental impacts of decommissioning an artificial island (unless abandoned in place) are unknown, but could reasonably be expected to be higher than decommissioning the other port design alternatives.

It is anticipated that four tugs would be required to assist with the maneuvering the LNGCs to dock with this port structure. This would increase vessel traffic and potential interactions with sensitive species in addition to increasing daily withdrawal volumes of support vessels as compared to the Proposed Action.

Potential environmental benefits of an artificial island port design alternative include the additions of hard surfaces which could serve as an artificial reef for potential colonization of hard-bottom communities. As demonstrated by other permanent offshore oil and gas structures, such facilities have a potential to support significant and diverse fish and shellfish communities. In addition, the creation of an artificial island could provide an alternative use for dredge spoil or other materials that would otherwise require disposal and use of landfill or offshore disposal capacities.

Reliability. Artificial islands are generally used in port designs that require LNG storage to facilitate continuous throughput. The artificial island port design could receive conventional LNGCs, which would maximize reliability.

Conclusion. The artificial island port design alternative could accommodate open- or closed-loop vaporization system or AAV technology and conventional LNGCs, and would provide enough space for storage or sufficient berthing area to accommodate a continuous throughput. However, creating an artificial island would be cost-prohibitive due to the water depth at the site 30.5 m (100 feet); thus, an artificial island would not be viable unless sited closer to the coast, which would likely increase both safety and environmental concerns in comparison with the proposed location. For these reasons, the artificial island port design alternative was eliminated from further analysis and consideration.

2.1.3.6 Submerged Turret Loading Buoy System (STL)

This concept differs from the other four technologies insofar as it does not involve any permanent storage or regasification facility. The proposed offshore port site would consist of a permanently installed single-point point submerged turret unloading buoy, and would receive SRVs that would be capable of containing onboard LNG vaporization equipment. After mooring, LNG would be vaporized onboard the vessel and discharged via the unloading buoy and a flexible riser into the subsea pipeline. Because the LNG would be vaporized with the SRV's onboard equipment, no permanent fixed or floating storage or vaporization facilities would be required. Unlike standard LNGCs, which offload LNG in 18 hours or less, SRVs offload natural gas (i.e., regasified LNG) and inject it into a subsea natural gas pipeline at standard pipeline pressures. As a result, this process can take 5 to 8 days to discharge a full cargo of LNG, and continuous off-loading operations are essential to minimize fluctuations in the throughput of natural gas. An example can be seen in **Figure 2.1-6**. There have been three variations of this design. Excelerate Energy's Gulf Gateway Project has begun operation in the GOM using a single buoy for intermittent send-out of natural gas. Excelerate's Northeast Gateway Project has begun operation in Massachusetts Bay using two buoys to allow continuous send-out with two vessels moored to the buoys during a transition period as the first vessel completes vaporizing its cargo and shuts down vaporization while the second vessel begins its vaporization cycle. Suez's Neptune Project in Massachusetts Bay is similar in design to Northeast Gateway and has begun construction. The Calypso Project proposed off the eastern Florida coast would have employed a two-buoy design that combined an FSRU and an SRV vessel design. The FSRU would have been permanently moored to one buoy. SRVs would dock at the second buoy. The Calypso application has been withdrawn by the applicant.

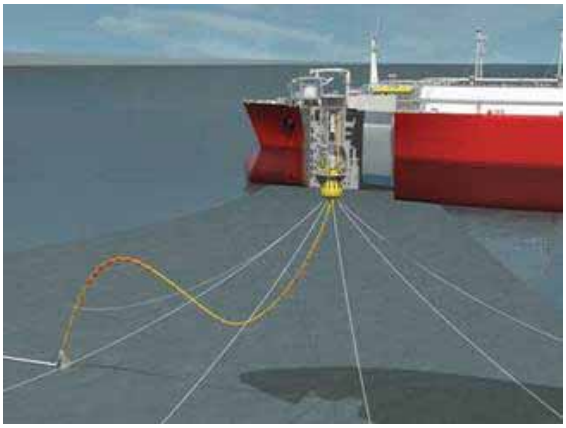


Figure 2.1-6. Submerged Turret Loading Buoy System (STL)

Source: USCG and MARAD 2007d

Environmental Impacts. The environmental impacts of floating designs would depend on the number of anchors installed and the method of installing the anchors. A discussion of impacts due to anchor type is included in **Section 2.1.5**. The number of anchors would be influenced by the size of the vessels with large vessels requiring larger sizes or numbers of anchors. If an STL design used two submerged turrets, its impacts would be greater than a project proposing a single turret.

Reliability. STLs that are designed for continuous supply of natural gas must have at least two buoy systems to allow continuous vaporization while SRVs transit to and from the Port site. One SRV would be moored at the Port and vaporizing LNG while a second SRV transited to the Port and moored at a second buoy. When the first SRV completed vaporizing its cargo, the second SRV would phase in. The first SRV would then depart and transit to pick up another LNG cargo. During severe weather events, the SRVs would not be able to moor and send out natural gas. Therefore, GBS and other fixed platform-based units might be more reliable than floating systems in severe weather conditions. However, LNGCs are limited by wave height when docking with the GBS or fixed platform-based port. Generally, LNGCs are limited to 2.0- to 2.5-m (6.6- to 8.2-foot) wave heights when docking. The FSRU could be designed to remain on location like a fixed platform-based unit or move to another location during hurricanes or other severe weather. The FSRU is also limited in wave height for the side-by-side unloading which cannot operate at waves greater than 2.0 m (6.6 feet).

An SRV can be moored to the specially designed unloading buoys in significant wave heights (3.5 m [11.5 feet]). **Table 2.1-3** compares the approximate percentages of time that wave heights greater than 2.0 m (6.6 feet) and 3.5 m (11.5 feet) occur in the Project area.

Table 2.1-3. Equivalent Days of Downtime

Operations	Significant Wave Heights (m)	Percentage of Year*	Number of Days
SRV	> 3.5	0.15%	0.5
GBS/platform	> 2.5	0.9%	3.3
FSRU	> 2.0	2.6%	9.5

Note: * Port Dolphin 2007j

Conclusion. The FSRU and GBS/Platform options are more sensitive to weather conditions than the STL buoy and FP options. The sensitivity is based on weather effects on mooring and unloading of SRVs, as well as the FSRUs processing operations due to LNG sloshing in tanks and other motion-related effects on fluid mechanics. However, based on the historic weather patterns at the proposed location, the total downtime for any system is limited to a few days at most. Provided that the wave conditions are not so extreme that the vaporization process would have to be shut down, the designs that provide onsite LNG storage would be able to continue send-out even if the LNGCs could not dock at the port. If extreme weather required shutdown of vaporization, then it would likely also limit operation of the STL buoy and FP projects as well. Therefore, weather-related reliability is likely to be similar for all port designs.

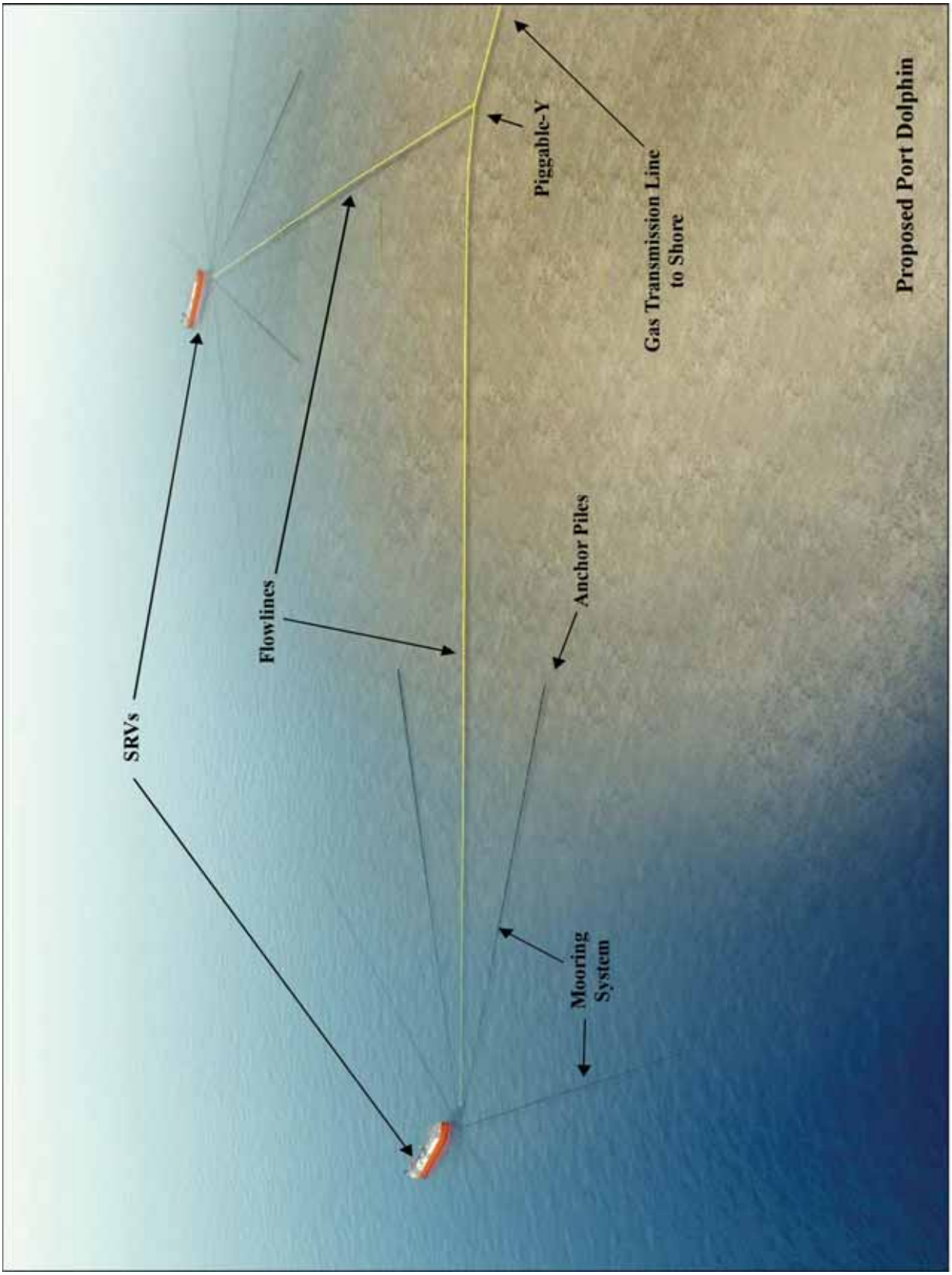
Each of the fixed systems, GBS, FSRU, and fixed platform-based units, have higher vulnerability to damage during extreme weather events. As demonstrated during Hurricanes Katrina and Rita, damage to GOM surface facilities can result in system shutdowns that extend longer than the weather event itself. Therefore, the STL buoy design offers reliability advantages. During a weather event the SRV can depart the STL buoy, the STL buoy can be safely moored below the surface, and the SRV can return and resume transfer as soon as the storm has passed.

The STL buoy design has a small environmental footprint and can be located in deeper water, farther from shore. SRVs can operate in more extreme sea conditions, and therefore provide greater reliability of service. The STL buoy design can support the Applicant's proposed gas send-out rates without additional storage or control platforms.

Based on environmental impacts, water depth, the local substrate, and general reliability in severe weather known to the area, the STL buoy system is a viable option. **Figure 2.1-7** shows the Port Dolphin conceptual site plan to be carried forward.

2.1.4 Port Location and Pipeline Route Alternatives

There are a number of possible locations off the U.S. coast that would be suitable for siting an LNG port. A company proposing to construct and operate an offshore port would have identified a market that it believes would provide the economic incentives that support licensing and construction costs, and, in this case, matches their technical expertise. Therefore, alternative offshore port locations must be evaluated in light of the target market for the natural gas. As stated in **Section 1.2**, the Project is intended to supply natural gas to the west-central Florida market and surrounding areas, and therefore only locations that meet these fundamental criteria would be considered.



Source: Port Dolphin 2007a

Figure 2.1-7. Port Dolphin Project Conceptual Site Plan

In light of the demand for energy in west-central Florida discussed in **Section 1.3**, it is reasonable to use a phased process to identify and evaluate potential locations for an offshore LNG import port considering the opportunities and constraints posed by each of the deepwater port concept designs available. The alternatives analysis used a screening and site-selection process that began with the entire west-central Florida coastal region and progressively narrowed the geographic range of locations where it would be reasonable and feasible to site an offshore LNG facility. The three steps of this siting process are Regional Site Screening, Suitable Area Analysis, and Site-Specific Analysis.

2.1.4.1 Phase 1 Regional Site Screening

This analysis considered various scenarios for siting an LNG deepwater import port at a location that would allow access to the Applicant's target market. The first phase (regional site screening) was to determine the general region along the west-central Florida coast with the greatest potential to meet regulatory, technical, operability, and interconnection requirements. The selected region would also need to meet the DWPA requirements as specified in Title 33 CFR Section 148.720 (listed above).

The Florida natural gas market is unique because conventional sources of natural gas to Florida are from areas to the north and west, and come into the state through interstate pipelines from the northern and central parts of the state and then down the peninsula. As shown in **Figure 1.3-1**, the existing natural gas pipelines serve specific geographical regions of the state with limited interconnection between the east and west coasts. Therefore, the ability to serve the west-central Florida area is limited by the capacities of the pipelines to move gas into the area. As a result, a location close to the intended area of service is necessary.

In identifying a potential site for a project, USCG guidelines (Title 33 CFR Section 148.720) for siting LNG deepwater port terminals must be considered. The guidelines indicate that an appropriate site for a deepwater port meets the following criteria:

- Optimizes location to prevent or minimize detrimental environmental impacts
- Minimizes the space needed for safe and efficient operation
- Locates offshore components in areas with stable seafloor characteristics
- Locates onshore components where stable foundations can be developed
- Minimizes the potential for interference with its safe operation from existing offshore structures and activities
- Minimizes the danger posed to safe navigation by surrounding water depths and currents
- Avoids extensive dredging or removal of natural obstacles such as reefs
- Minimizes the danger to the port, its components, and tankers calling at the port from storms, earthquakes, or other natural hazards
- Maximizes the permitted use of existing work areas, facilities, and access routes
- Minimizes the environmental impact of temporary work areas, facilities, and access routes
- Maximizes the distance between the port and its components and critical habitats including commercial and sport fisheries, threatened or endangered species habitats, wetlands, floodplains, coastal resources, marine management areas, and EFH
- Minimizes the displacement of existing or potential mining, oil or gas production, or transportation uses

- Takes advantage of areas already allocated for similar use, without overusing such areas
- Avoids permanent interference with natural processes or features that are important to natural currents and wave patterns
- Avoids dredging in areas where sediments contain high levels of heavy metals, biocides, oil, or other pollutants or hazardous materials, and in areas designated as wetlands or other protected coastal resources.

A principal screening criterion is to interconnect with one or more existing transmission pipeline systems. This is necessary to allow delivery of the gas to the intended market without the environmental impacts associated with developing an extensive pipeline system to serve the intended market. This is a primary environmental screening criterion since construction of long onshore or offshore pipeline systems would involve extensive environmental impacts. As shown in **Figure 1.3-1**, the only currently existing interstate natural gas pipelines in the region are the Gulfstream Pipeline that runs offshore near the proposed Project location and then onshore in the southern part of Tampa Bay, and the Florida Gas Transmission Pipeline that runs from the northern part of the state down and through the Tampa Bay area and terminates between Tampa Bay and Fort Myers.

Criterion 1, Proximity to an Existing Commercial Port. The deepwater Port would require a variety of services from onshore facilities. Therefore, an existing commercial port capable of providing these services should be within 160 km (100 mi) of the proposed Port location to ensure reasonable access to the Port would be available.

Criterion 2, Required Operational Water Depths. The STL port design identified in **Section 2.1.3.6** requires sufficient depth for the buoy to remain submerged when not in use and not present a navigational hazard. When the buoy is mated to the SRV, there must be sufficient water depth to ensure the buoy would not strike the seafloor as the SRV rises and falls with wave action. The FSRU design requires sufficient depth to accommodate the mooring lines and flexible risers connecting to the subsea pipeline. Therefore, a minimum operational depth of 30.4 m (100 feet) was selected.

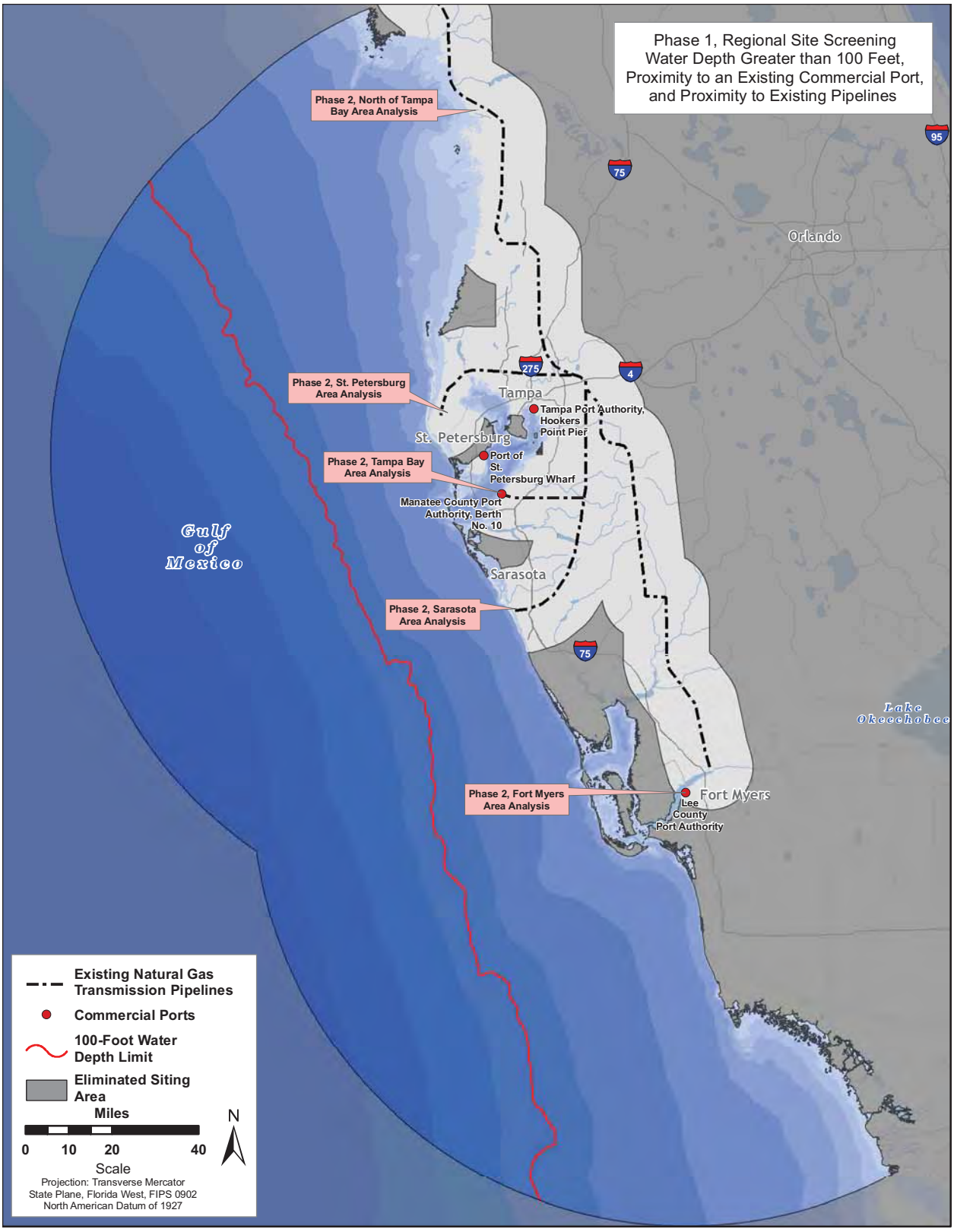
Criterion 3, Proximity to Existing Onshore Pipelines. To provide a reasonable proximity of interconnection, existing onshore pipelines would need to be within about 10 miles of the coast. Florida has a number of sensitive habitats so extensive disturbance from construction of a long interconnecting pipeline would be unacceptable.

2.1.4.2 Phase 1 Analysis

Based upon the regional site-screening evaluation, the areas within the region where it would be reasonable and feasible to locate an SRV facility would be five areas offshore: north of Tampa Bay where the FGT Pipeline is within 10 miles of the coast; the St. Petersburg area where the FGT pipeline is within 10 miles of the coast; off of Tampa Bay where both the FGT and Gulfstream Pipelines are within 10 miles of the coast; off of Sarasota where the FGT pipeline again comes within 10 miles of the coast; and near the Caloosahatchee River area near Fort Myers, Florida, as shown on **Figure 2.1-8**. Advantages of these areas include the following:

- Proximity to the west-central Florida market
- Proximity to an existing pipeline network
- Pipeline corridors within reasonable distances
- Proximity to existing commercial ports.

Each of these five areas were carried forward for additional screening.



Source of Existing Transmission Pipelines: Port Dolphin 2007a; Source of Eliminated Siting Area: e²M Inc 2008.

Figure 2.1-8. Phase 1, Regional Analysis

2.1.4.3 Phase 2 Suitable Area Analysis

The secondary screening process compared the advantages and disadvantages of the alternative locations within the feasible areas identified in Phase 1 to eliminate those locations where it is not reasonable or feasible to locate an LNG deepwater port facility. The selection criteria included avoidance of, to the extent possible, sensitive coastal environmental resources, environmentally sensitive land cover, and National Wetland Inventory (NWI) mapped areas; and appropriate land use and zoning for onshore pipeline segments, especially the landing area for a horizontal directional drill (HDD) from offshore to onshore portions to minimize coastal impacts. Desktop screening using publicly available data was used to compare the areas. The five areas identified as suitable in the Phase I screening (see **Figure 2.1-8**) from north of Tampa Bay to Fort Myers are north of Tampa Bay, St. Petersburg area, Tampa Bay area, Sarasota area, and Fort Myers area (see **Figures 2.1-9** through **2.1-13**). These areas were evaluated using the following criteria.

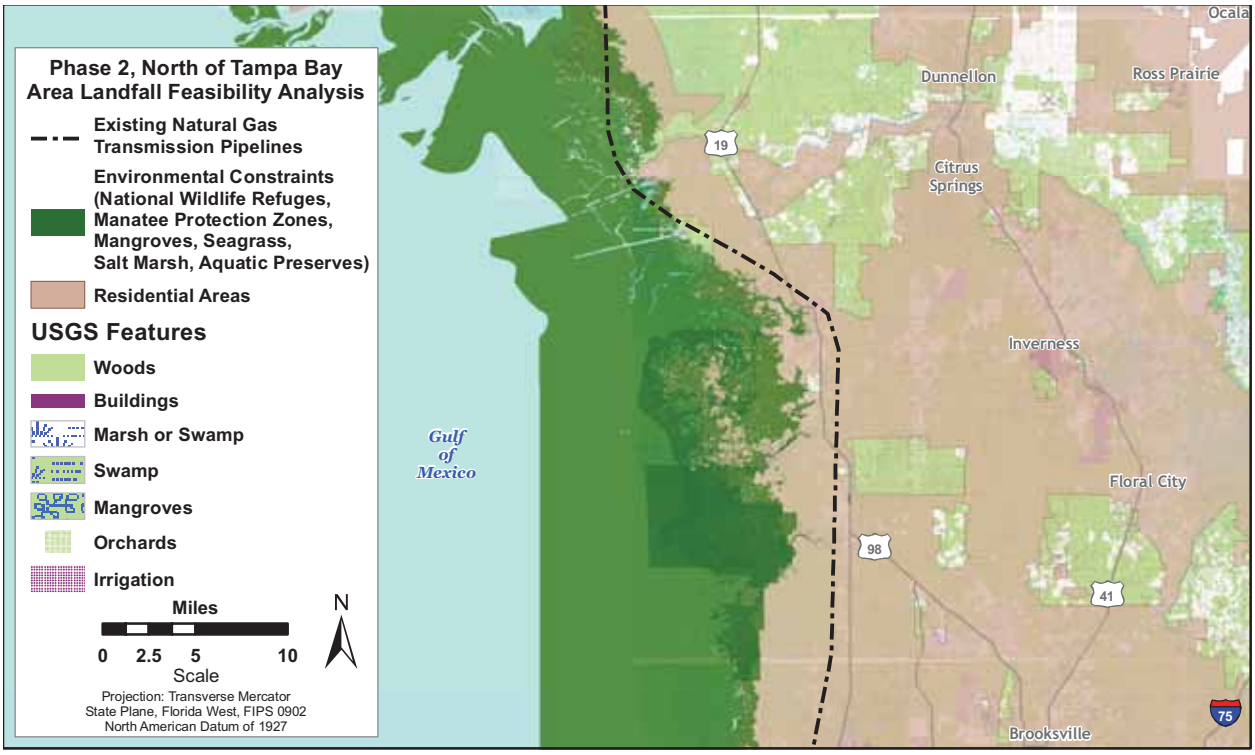
Criterion 1, Avoidance of, to the Extent Possible, Sensitive Coastal Environmental Resources. Maps of resources, including seagrass beds, protected waters, sea turtle habitat, mangrove resources, and other environmentally sensitive resources, were obtained from Applicant-provided and publicly available sources. The information was organized using geographical information system (GIS) data layers to create maps of the identified area. Each area was evaluated and the potential extent of impacts was estimated.

Criterion 2, Avoidance of, to the Extent Possible, Inappropriate Land Use Designations. For a pipeline to be brought onshore to an interconnection point with an interstate or intrastate pipeline, suitably zoned property must be available for HDD and pipeline construction activities. Although pipeline construction and operation is allowed as a conditional use in residential areas, sufficient area must be available for the HDD site, construction laydown and staging areas, and rights-of-way (ROWs) for pipeline construction. Selection of densely populated residential areas complicates the construction process and increases adverse socioeconomic impacts. Land use designations were obtained and potential pipeline routes from the areas off the coast identified in the Phase I screening. **Figures 2.1-9** through **2.1-13** show the areas that were evaluated and detailed maps and photographs of the areas located as potential landfall sites are included in **Appendix F**. Each area is discussed in **Appendix F**.

2.1.4.4 Phase 2 Analysis

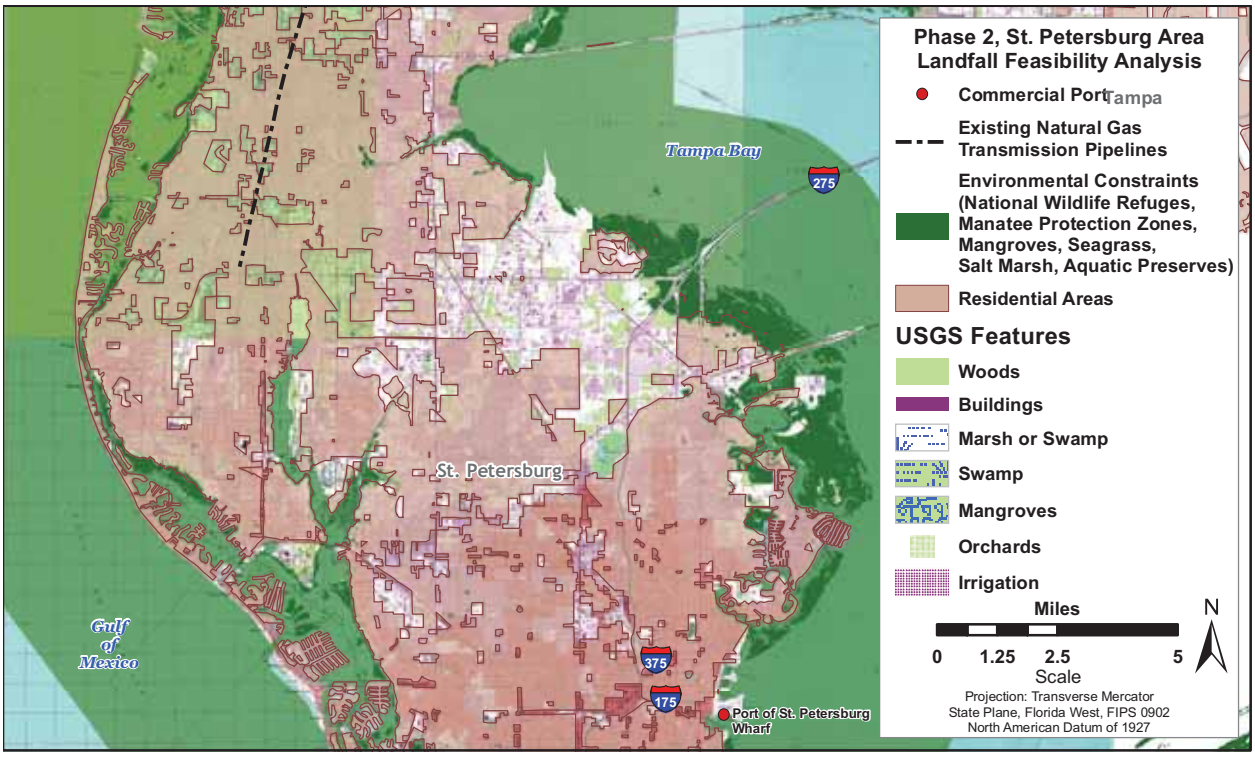
The area north of Tampa Bay as shown in **Figure 2.1-9**, is characterized by coastal environmental resources and environmentally sensitive areas, including seagrass beds, turtle habitat, mangrove resources, and protected waters. The land between the coast and the FGT Pipeline is densely developed with predominantly residential areas. The Applicant also reported that, in discussions with state agencies, the area was not recommended for interconnection with the interstate pipeline (Port Dolphin 2007n). Therefore, the area north of Tampa Bay was not carried forward for detailed analysis.

The St. Petersburg area in the vicinity of the FGT pipeline, shown in **Figure 2.1-10**, is also characterized by coastal environmental resources and environmentally sensitive areas, including seagrass beds, turtle habitat, mangrove resources, and protected waters. The land between the coast and the FGT Pipeline is densely developed with predominantly residential areas. Therefore, the St. Petersburg area was not carried forward for additional analysis.



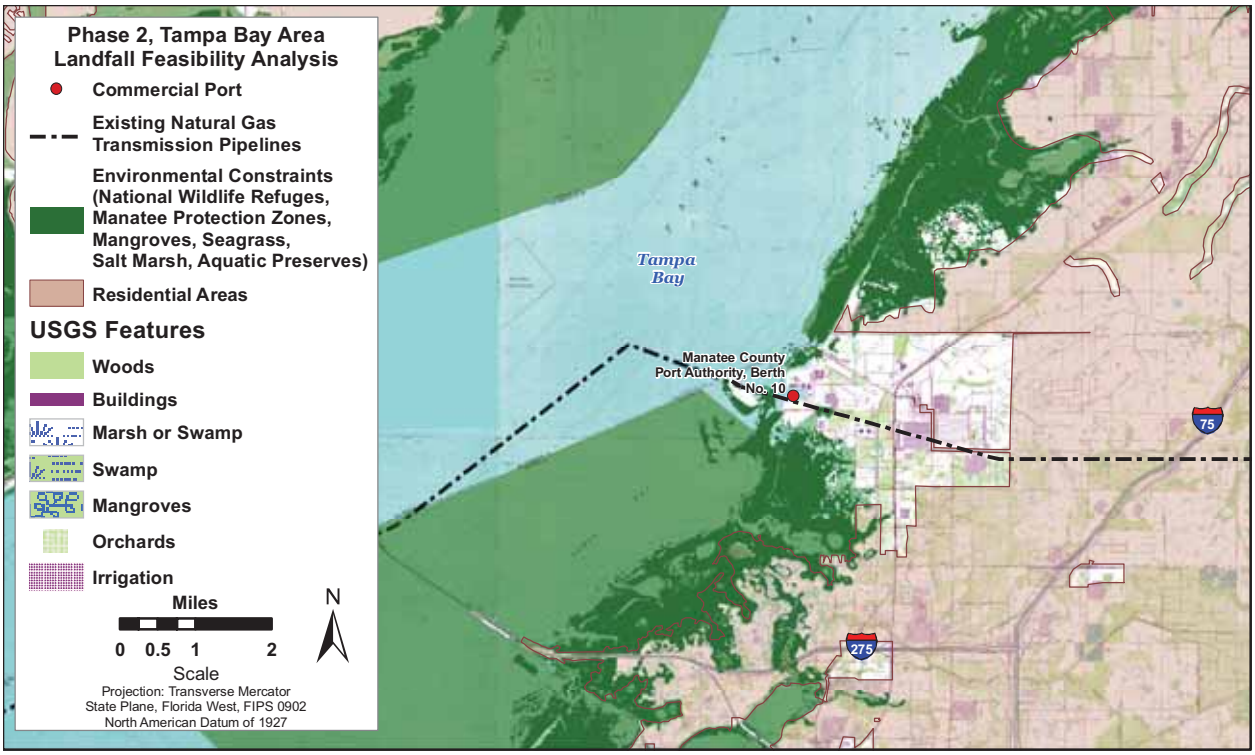
Source of Existing Transmission Pipelines: Port Dolphin 2007a; Source of Environmental Constraints: ConShelf 2007.

Figure 2.1-9. Phase 2, Area North of Tampa Bay Area Analysis



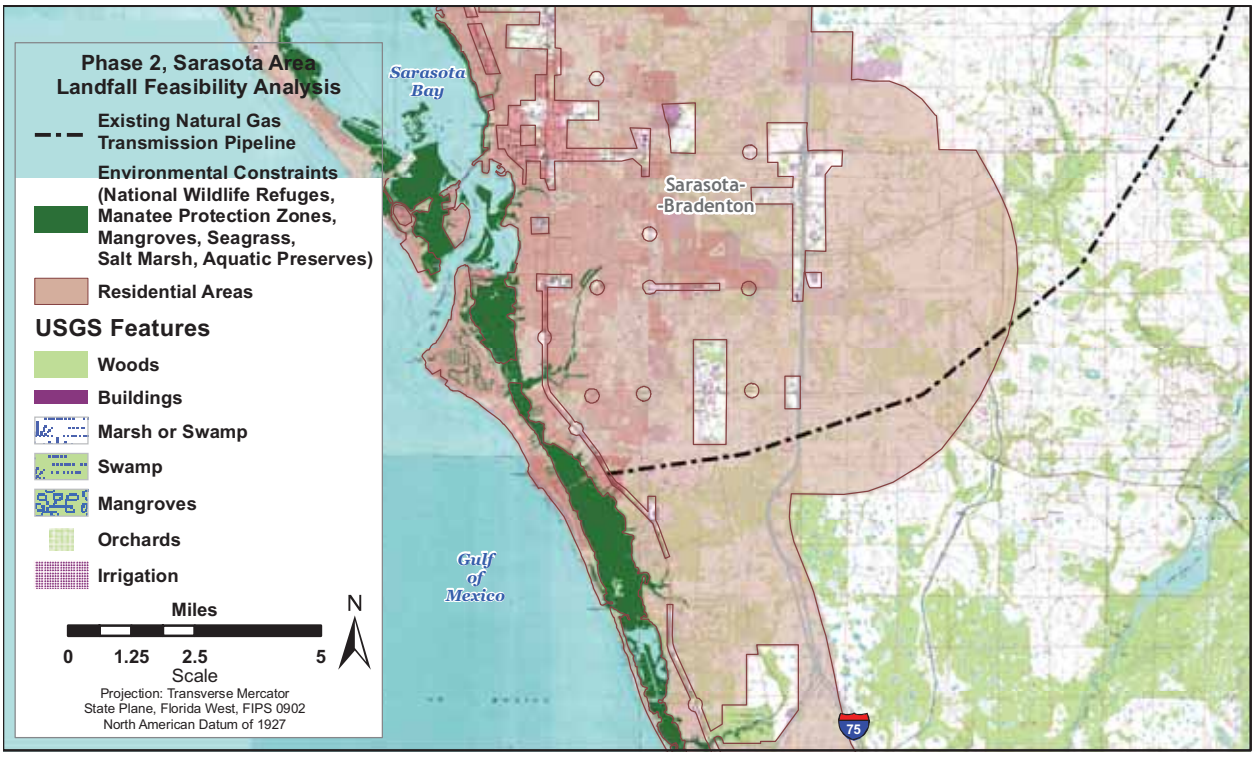
Source of Existing Transmission Pipelines: Port Dolphin 2007a; Source of Environmental Constraints: Conshelf 2007.

Figure 2.1-10. Phase 2, St. Petersburg Area Analysis



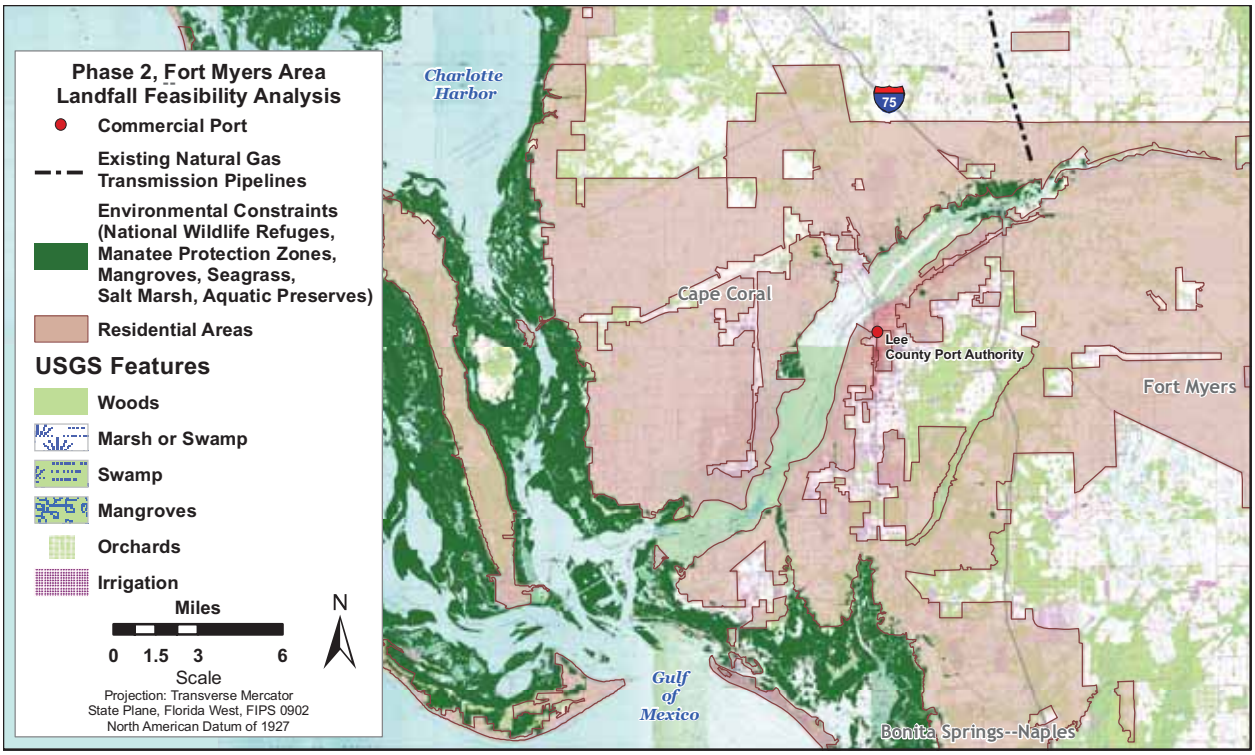
Source of Existing Transmission Pipelines: Port Dolphin 2007a; Source of Environmental Constraints: ConShelf 2007.

Figure 2.1-11. Phase 2, Tampa Bay Area Analysis



Source of Existing Transmission Pipelines: Port Dolphin 2007a; Source of Environmental Constraints: ConShelf 2007.

Figure 2.1-12. Phase 2, Sarasota Area Analysis



Source of Existing Transmission Pipelines: Port Dolphin 2007a; Source of Environmental Constraints: ConShelf 2007.

Figure 2.1-13. Phase 2, Fort Myers Area Analysis

Several properties were identified around Tampa Bay that could support pipeline construction. However, as shown in **Appendix F**, they require crossing the navigation channel in areas where dredging is routinely used for channel maintenance or they require longer offshore pipelines through sensitive coastal areas. The Port Manatee property offers a relatively large, industrial area with offshore access through minimal environmental resources. The potential pipeline interconnection would predominantly be through industrial, agricultural, and undeveloped land. Therefore, the area off of Tampa Bay was carried forward for additional analysis.

South of Tampa Bay in the Sarasota area, the coastal area is densely developed with residential properties for at least 8 km (5 mi) from the coast, making it unsuitable for pipeline construction. Coastal resources also include seagrass beds, turtle habitat, mangrove resources, and protected waters. One area south of the FGT pipeline has nonresidential property closer to shore, but that property is a State Recreational Area and therefore not suitable for pipeline construction (see **Figure 2.1-12** and **Appendix F).** Therefore, the area south of Tampa Bay was not carried forward for additional analysis.

The area near Fort Myers and the Caloosahatchee River is characterized by a similar high concentration of seagrass beds, turtle habitat, mangrove resources, and protected waters. In addition, the interstate pipeline can only be accessed from within the Caloosahatchee River Delta. Because of the barrier islands and shipping channels, a pipeline would have to be constructed through miles of sensitive inland waters or a very long (more than 20 miles) onshore pipeline would have to be constructed to an interconnection point with the FGT pipeline (see **Figure 2.1-13** and **Appendix F**). Therefore, the Fort Myers area was not carried forward for additional analysis.

2.1.4.5 Phase 3 Port Site Specific Analysis

The primary and secondary screening processes resulted in the selection of an area off Tampa Bay as the only area meeting the screening criteria for the siting of an LNG deepwater port facility and pipeline routes to shore. Because the seafloor off Tampa Bay is relatively uniform, the entire area off the coast with water depths over 30.5 m (100 feet) could be considered for the Port site. However, the farther the potential port location is from the entrance to the bay, the longer the offshore pipeline would be, and therefore, the greater the potential impacts during construction. Therefore, the potential sites identified by the Applicant were evaluated and determined to represent a reasonable subset of the area. These areas were screened based on the following criteria: avoidance of archeological resources, avoidance of shipping lanes, avoidance of mapped sand resources, avoidance of ocean dredged material disposal sites (ODMDSs), and avoidance of fish havens. When information was available, the differences in impacts on hard-bottom areas between the alternatives were evaluated. Where information was not available, it was assumed that a longer route would result in greater impacts on hard-bottom areas.

For any pipeline route, the criterion from the Phase 2 analysis related to avoidance of sensitive coastal environmental resources would still be applicable as specific locations in the Tampa Bay area are screened. In addition, for onshore pipeline routes, the criterion in the Phase 2 analysis related to avoidance of inappropriate land use designations would be applicable as onshore alternatives are screened.

Criterion 1, Avoidance of Archeological Resources. Known prehistoric or historic sites should be avoided.

Criterion 2, Avoidance of Shipping Lanes. Operation of the port should not interfere with existing or planned commercial shipping fairways. Only sites located outside the boundaries of designated shipping fairways should be considered. The site must also be accessible to SRVs from the commercial shipping lanes, so sites located near but not in the designated lanes would be preferred. Minimizing pipeline crossings of shipping lanes is also a priority since the pipeline would have to be protected from potential anchor strikes from transiting vessels.

Criterion 3, Avoidance of Mapped Sand Resources. Siting a project in a sand resource area permitted by the Minerals Management Service (MMS) or FDEP would be difficult. To the extent possible, permitted sand resource areas should be avoided for the port site and minimized for the pipeline route consistent with minimizing impacts on other environmental resources.

Criterion 4, Avoidance of Ocean Dredged Material Disposal Sites. Siting a project in an identified dredged material disposal site would be difficult, and likely would not be approved by USACE in coordination with USEPA.

Criterion 5, Avoidance of Fish Havens. Fish havens have been established by state agencies, sport fishing organizations, and individuals. These frequently involve promotion of artificial or natural reef development to attract fish. There are several mapped areas off of Tampa Bay that should be avoided.

Criterion 6, Minimize Impacts on Wetlands and Protected Habitat for Onshore Pipeline Alternatives. Areas that have been delineated as wetlands and areas with habitat for known threatened or endangered species should be avoided to the extent practicable.

2.1.4.6 Phase 3 Analysis – Site-Specific Analysis

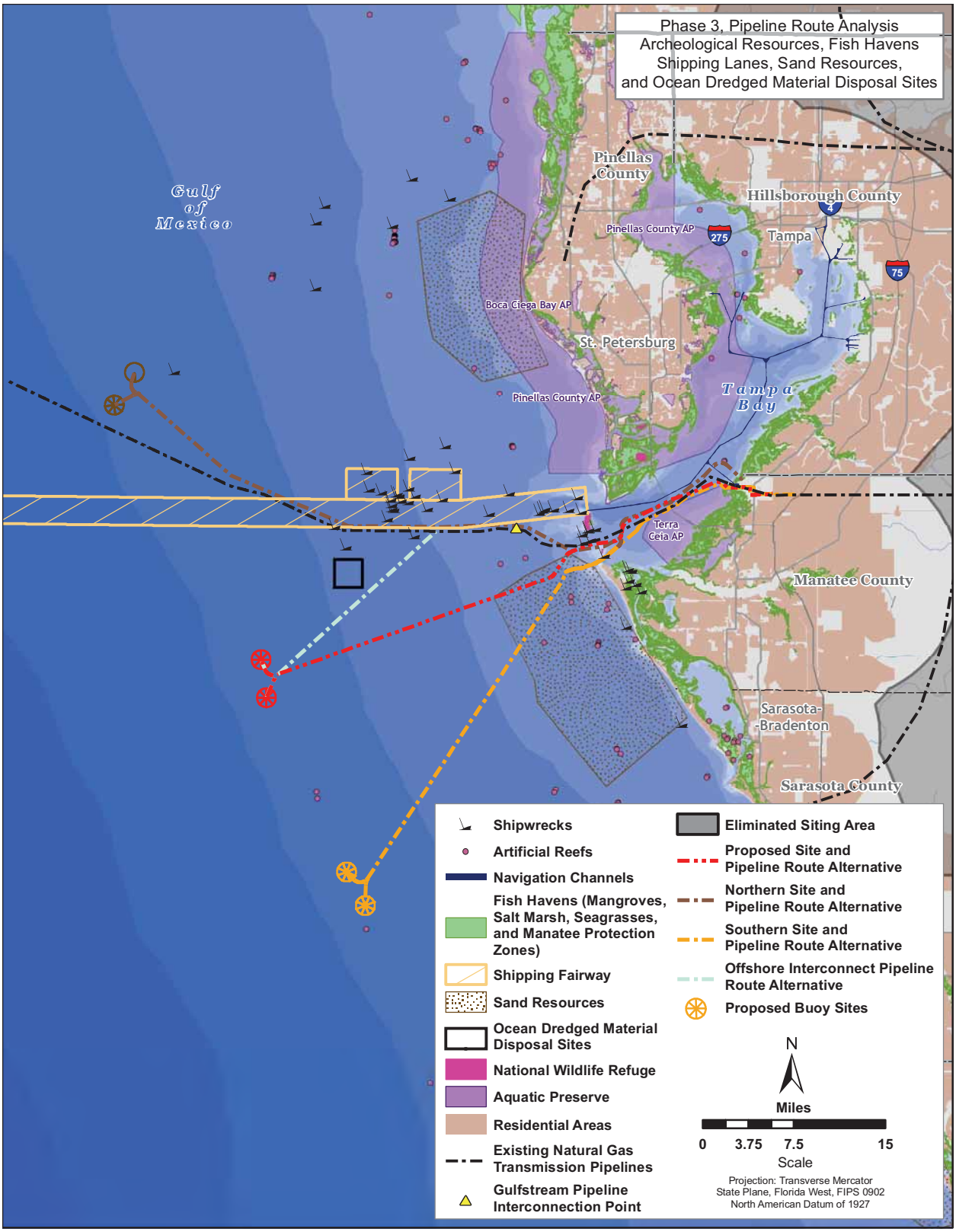
The Applicant surveyed areas of 7,620 m (25,000 feet) by 3,810 m (12,500 feet) off the coast of Tampa Bay for potential port sites. They also surveyed a corridor from the site areas to the shore that was 914 m (3,000 feet) wide.

The Applicant identified three alternative site locations and associated pipeline route corridors for the transmission of natural gas from the port to the pipeline interconnection points. These port and pipeline alternatives are referred to as the Proposed Site and Pipeline Alternative, the Northern Site and Pipeline Alternative, the Southern Site and Pipeline Alternative, and the offshore interconnection Pipeline Alternative. Based on comments on the initial site and route evaluation discussed in the Draft EIS, additional alternatives have been considered. These included adding an offshore interconnection to the Gulfstream Pipeline and modifications to the proposed pipeline route to minimize impacts on sand resources while maintaining acceptable impacts on other benthic resources. Offshore pipeline alternatives are shown in **Figures 2.1-14** though **2.1-17**. The following discusses the criteria used in evaluating the potential sites and routes. **Table 2.1-4** outlines the offshore pipeline route alternatives.

Table 2.1-4. Offshore Pipeline Route Alternatives

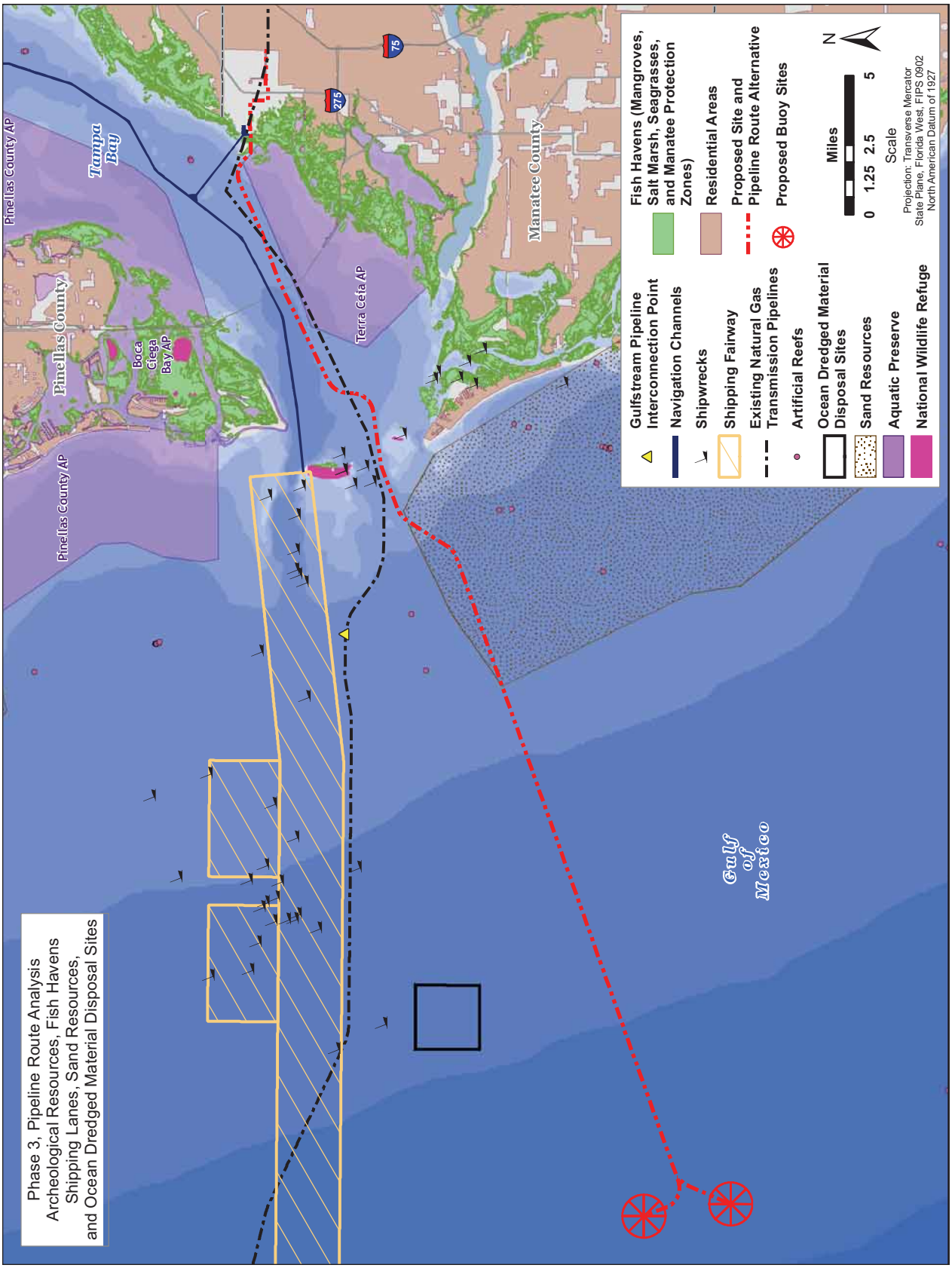
Port Site Associated with Pipeline Route	Offshore Pipeline Length	Construction Footprint (3,000-foot-wide corridor)	Construction Method	Estimated Volume of Resuspended Sediment (m^3) *
Proposed Site and Route Alternative	67.6 km (42 mi)	16,728 acres	Conventional trenching using anchor barges and concrete mattresses where necessary offshore. HDD or boring under sensitive areas. Conventional trenching with special protection in wetland areas onshore.	338,000
Northern Site and Route Alternative	89.6 km (56 mi)	20,364 acres	Conventional trenching using anchor barges and concrete mattresses where necessary offshore. HDD or boring under sensitive areas. Conventional trenching with special protection in wetland areas onshore.	448,000
Southern Site and Route Alternative	74 km (46 mi)	18,180 acres	Conventional trenching using anchor barges and concrete mattresses where necessary offshore. HDD or boring under sensitive areas. Conventional trenching with special protection in wetland areas onshore.	370,000
Proposed Site and Offshore Interconnection with Gulfstream Pipeline Alternative	28.8 km (18 mi)	6,545 acres	Conventional trenching using anchor barges and concrete mattresses where necessary offshore. HDD or boring under sensitive areas. No onshore construction.	144,000

Note: * Volume of sediment resuspended calculated based on estimates in MMS 2001 and assuming the full length of the pipeline route is plowed.



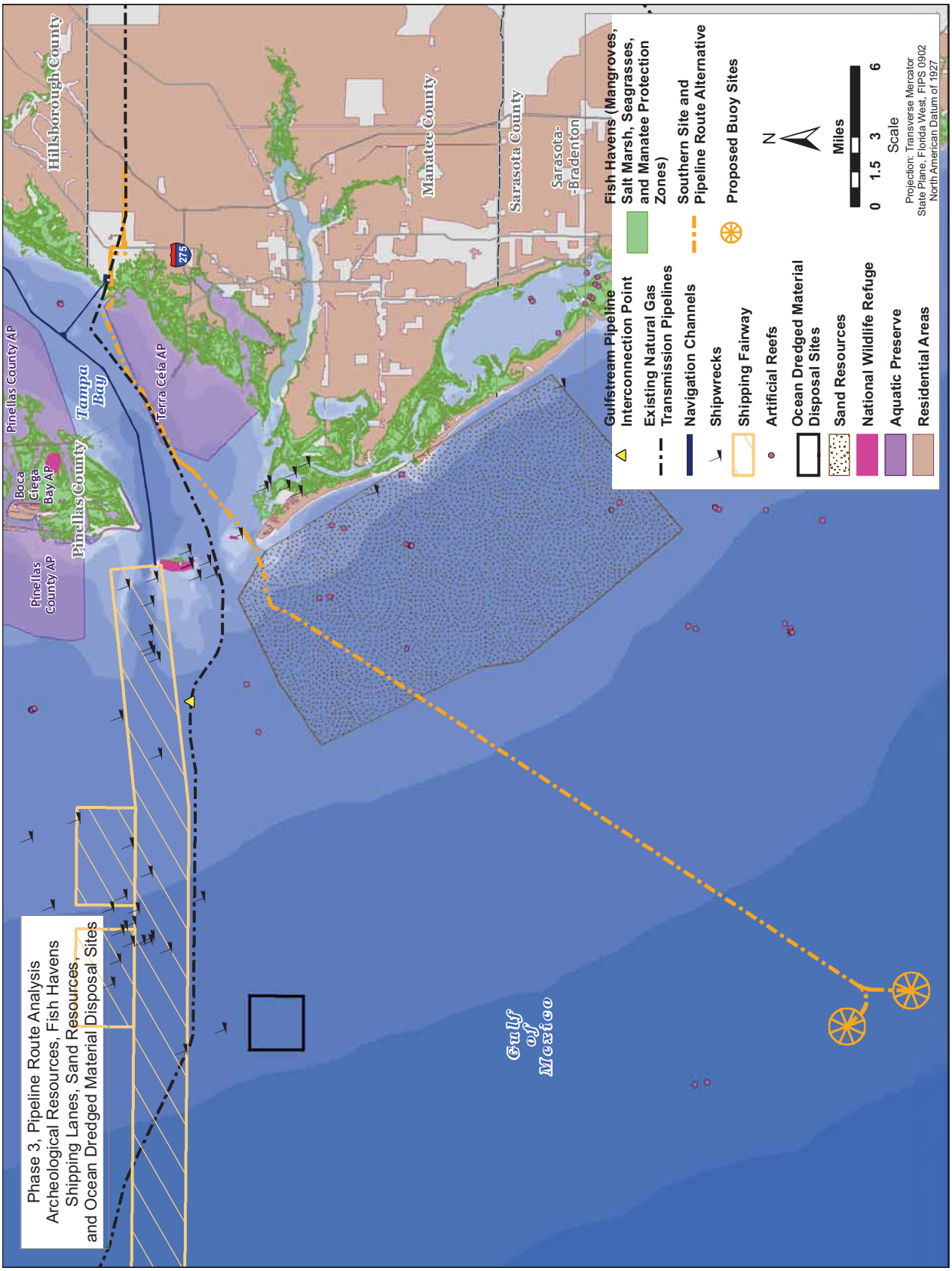
Source of Proposed Piplines: ConShelf 2007. Source of Florida Gas Transmission Pipeline: ConShelf 2007. Source of Eliminated Siting Area: e²M Inc 2008.

Figure 2.1-14. Phase 3, Pipeline Route Analysis



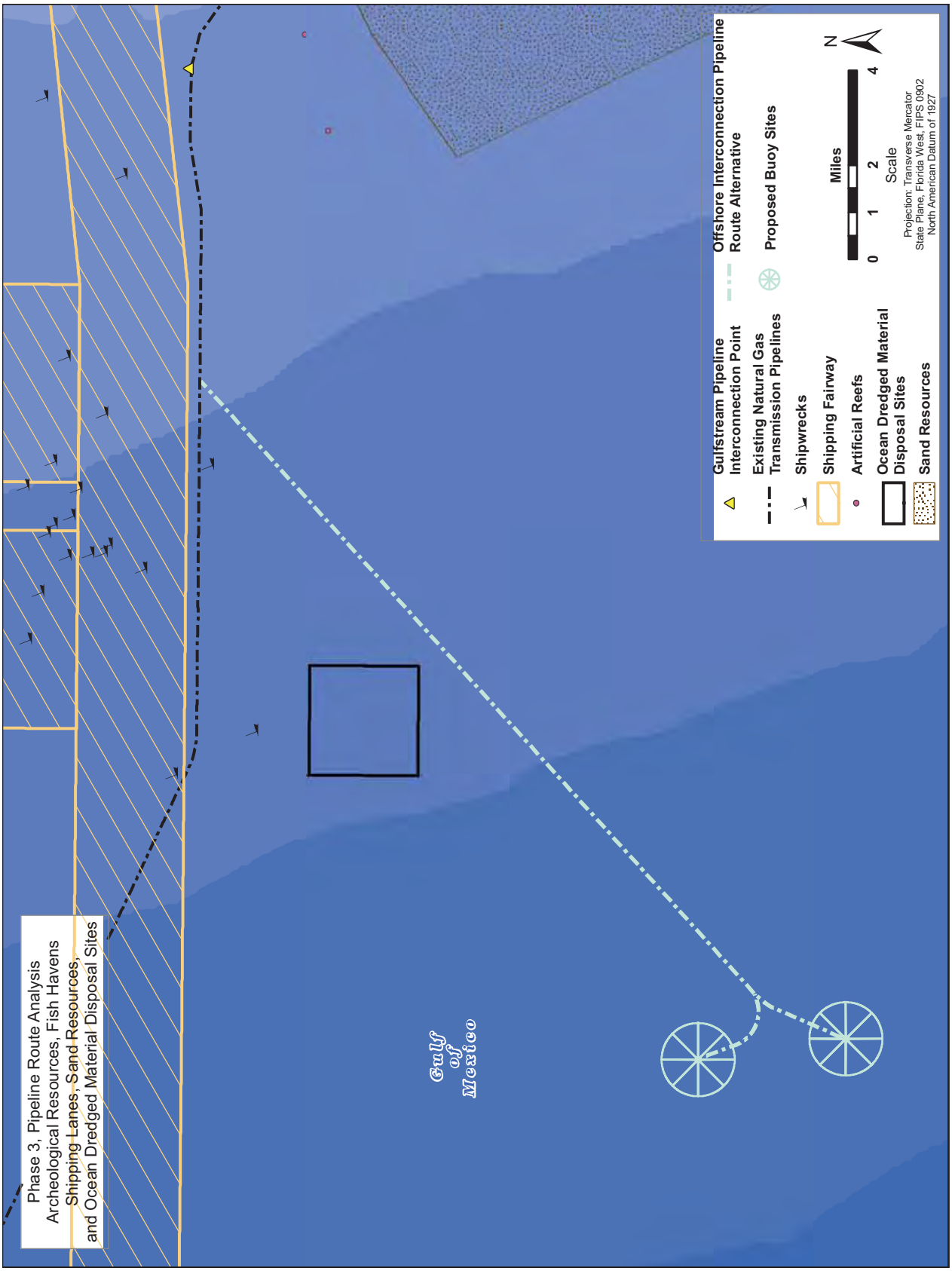
Source of Proposed Piplines: ConShelf 2009. Source of Florida Gas Transmission Pipeline: ConShelf 2007. Source of Constraints: ConShelf 2007.

Figure 2.1-15. Phase 3, Proposed Pipeline Route



Source of Southern Pipline: ConShelf 2007. Source of Florida Gas Transmission Pipeline: ConShelf 2007. Source of Constraints: ConShelf 2007.

Figure 2.1-16. Phase 3, Southern Route Alternative



Source of Offshore Interconnect Alternative: e²M, Inc. 2008. Source of Florida Gas Transmission Pipeline: ConShelf 2007. Source of Constraints ConShelf 2007.

Figure 2.1-17. Phase 3, Offshore Interconnection Alternative

Offshore Pipeline Alternatives. The Proposed Port Site would be centered at 83°11'36.23"W/ 27°23'51.26"N. From there, the interconnection pipeline would proceed east-northeast through MMS St. Petersburg (PB) blocks: PB463, PB507, PB506, PB505, PB504, PB548, PB547, PB546, PB545, and PB589. The pipeline would pass between Egmont Key and Mullet Key (Fort De Soto County Park), north of the Terra Ceia Protected Area before taking a northerly path close to Manbirtee Key. The Proposed Route would avoid known archeological resources, shipping lanes, and fish havens. It would potentially impact sand resources.

The Southern Port Site would be centered at 83°4'5.12"W/27°8'44.04"N. From there the interconnection pipeline would proceed northeast through MMS PB blocks: PB812, PB768, PB769, PB725, PB726, PB682, PB638, PB639, PB595, PB596, and PB552. It would follow a route between Egmont and Passage Keys and would pass the Terra Ceia Protected Area and make landfall on property owned by Port Manatee. The Southern Route would avoid known archeological resources, and shipping lanes. It would potentially impact the Terra Ceia Aquatic Preserve and mapped sand resources. This alternative is carried forward for detailed review to determine the extent of these impacts.

The Northern Port Site would be centered at 83°23'2.64"W/27°44'33.28"N. From there the interconnection pipeline would proceed southeast through MMS PB blocks: PB190, PB233, PB234, PB235, PB279, PB280, PB324, PB325, PB326, PB370, PB371, PB372, PB373, PB374, and PB375. It would continue between Egmont and Passage Keys and would pass through the northern edge of the Terra Ceia Protected Area before taking a northerly path close to Manbirtee Key. The Northern Route Alternative would then proceed to a landfall point at the northern end of Port Manatee (see **Figure 2.1-14**). As shown in **Figure 2.1-14**, the Northern Pipeline Route must cross the shipping fairway into Tampa Bay, pass north of Passage Key, and then conform to the Proposed Route through Tampa Bay. The location of the Fairway crossing and route toward the entrance to Tampa Bay is restricted by the offshore disposal area and a number of mapped historical wrecks. The potential for disturbance of historical wrecks would be higher if this alternative were constructed. The pipeline cannot enter Tampa Bay farther north of the Proposed Route because of the concentration of identified wrecks near Egmont and Mullet Keys. The pipeline would also pass through hard and live bottom areas identified during the review of the Gulfstream Pipeline by FERC. FDEP requested Gulfstream to avoid these areas, and the Gulfstream pipeline route was revised to pass further to the south than originally proposed. Therefore, the Northern Route Alternative is not carried forward for detailed evaluation.

In addition to the offshore routes that connect to existing pipelines onshore, an alternative offshore pipeline route would be to interconnect with the Gulfstream Pipeline offshore, near the proposed site. This pipeline alternative would pass through MMS PB blocks: PB374, PB418, PB417, PB461, PB460, PB504, PB503, PB502, PB546, PB545, and PB589. One potential offshore interconnection location proposed by Gulfstream is shown on **Figure 2.1-17**. This alternative would be approximately 28.8 km (18 mi) in length. This would eliminate approximately 40 to 60 km (24 to 38 mi) of the offshore pipeline impacts and all the nearshore and onshore impacts. There are technical issues that would have to be resolved to allow an offshore interconnection, including operating pressure, pipeline capacity, and loss of an independent, competing source of natural gas into the western Florida region. These issues have been brought before the FERC in filings by Port Dolphin and Gulfstream. The Offshore Interconnection Route would avoid known archeological resources, shipping lanes, mapped sand resources, fish havens, and all nearshore and onshore environmental resources. It would also be shorter than the proposed pipeline route. Therefore, the Offshore Interconnection Route has been carried forward for detailed analysis of impacts.

In comments submitted during the Draft EIS public comment period, the City of Longboat Key and the counties of Manatee and Sarasota objected to the proposed pipeline route because it impacted a permitted offshore sand borrow area used to replenish beach sand. The Applicant proposed a revised pipeline route

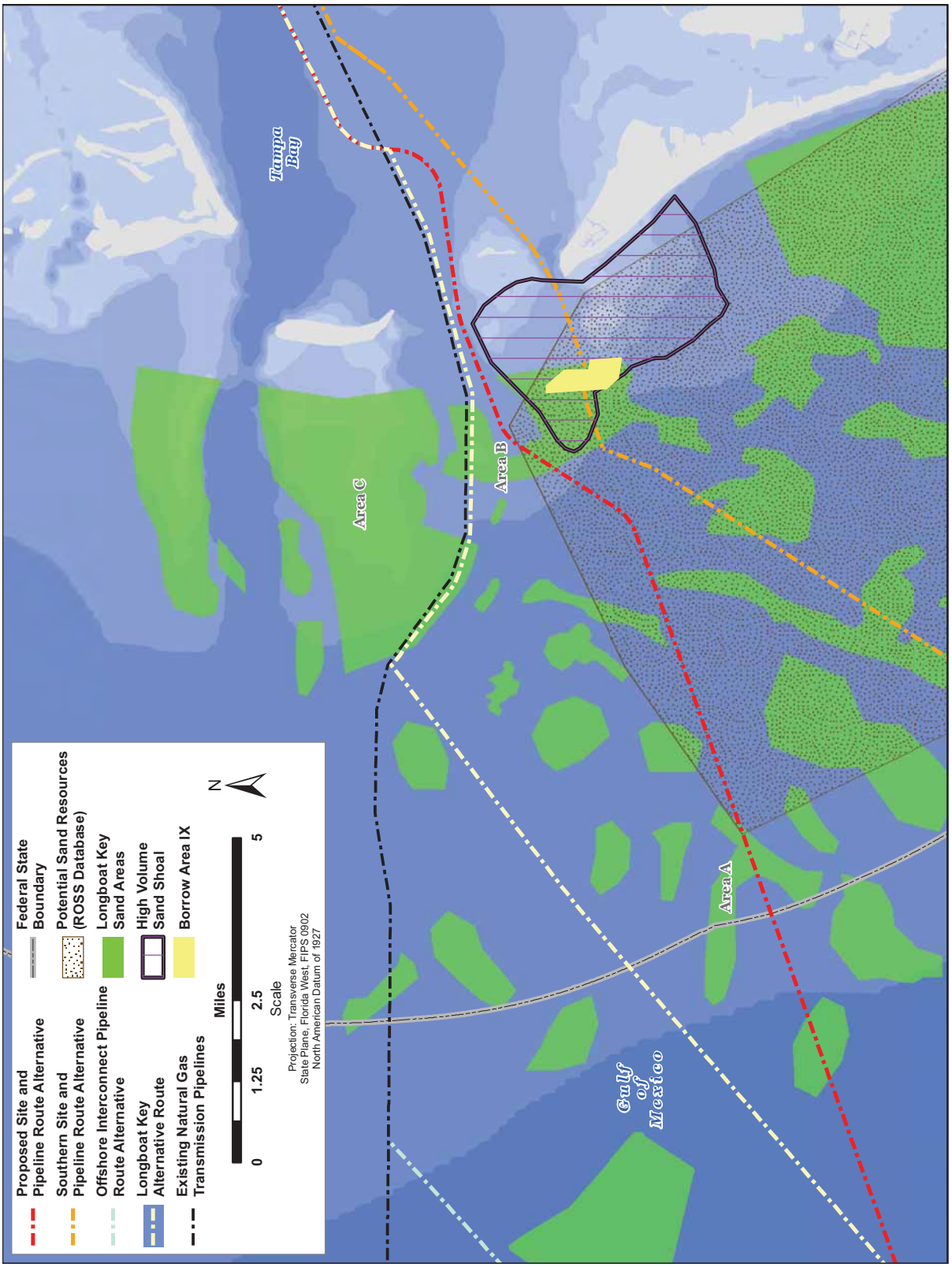
to avoid the permitted area. In response Longboat Key proposed alternative routes. One of these routes would deviate from the Applicant's revised proposed route as shown in **Figure 2.1-18**. The alternative route suggested by Longboat Key was evaluated based on information included in documents filed with FERC and FDEP during the processing of the initial certificate application for the Gulfstream Natural Gas Interstate pipeline, which is adjacent to a portion of Longboat Key's suggested alternative. Information on potential sand resources submitted by Longboat Key was also evaluated. During the Gulfstream evaluation, FDEP requested that Gulfstream reroute the pipeline from its proposed route to an area just south of the Tampa Bay shipping channel (north of where it had originally been proposed) to avoid concentrations of live- and hard-bottom areas. If the route proposed by Longboat Key were followed, the Port Dolphin pipeline route would traverse the same areas identified by FDEP as areas to avoid. Based on the sand resource information provided by Longboat Key and shown on **Figure 2.1-15**, the Applicant's revised proposed route would pass through approximately 2,259 m (7,413 feet) of identified sand resource areas (marked as areas A and B on **Figure 2.1-18**). The route proposed by Longboat Key would pass through 5,052 m (16,575 feet) of sand resource areas (marked as areas B and C on **Figure 2.1 18**). Even if the buffer zone for the route proposed by Longboat Key is assumed to overlap a Gulfstream Pipeline buffer zone, the resulting impact area would be reduced by half. The impacted ROW would be approximately 61 m (200 feet) in this case, which would still impact an area similar to the revised proposed route, assuming that both areas have the same depth of sand.

Although detailed geotechnical surveys have not been made of the area proposed by Longboat Key, their submittal notes that the area was proposed because it is characterized by a lack of sand resources. Therefore, one can reasonably assume that the route proposed by Longboat Key would likely impact more hard-bottom area, which FDEP specifically objected to in the Gulfstream proceedings. In addition, an offshore interconnection with the Gulfstream Pipeline is already being evaluated in detail in this EIS (Offshore Gulfstream Interconnect). The Offshore Gulfstream Interconnect route alternative is essentially parallel to the alternative route proposed by Longboat Key, west of the hard-bottom area identified by Longboat Key, and in less-sensitive biological areas.

In selecting alternatives to evaluate, a reasonable range that covers the full spectrum of alternatives should be considered. However, if a proposed alternative is not substantially different from either the proposed or another alternative, or would result in unacceptable additional impacts, then detailed analysis is not required[1]. For the route alternative proposed by Longboat Key, the impacts on sand resources would potentially be greater, although the sand resources affected would be geographically farther from Longboat Key. In addition, the potential impacts on hard-bottom areas would be greater, and the pipeline would traverse areas specifically identified by FDEP for avoidance in an earlier proceeding. Finally, portions of Longboat Key's suggested route alternative are redundant with an alternative route already being evaluated in detail. An evaluation of the impacts on sand resources of the Applicant's revised proposed route and an evaluation of the offshore interconnection to the Gulfstream Pipeline are included in **Section 4**. The alternative pipeline route proposed by Longboat Key is not carried forward for detailed evaluation.

Several alternative locations were identified with appropriate land use designations and size to support the construction area associated with the HDD necessary to bring the pipeline ashore. After detailed review, only the proposed location on Port Manatee was carried forward because the other sites involved longer onshore and offshore pipelines with attendant impacts and longer HDD, and some alternatives required crossing the shipping channel. **Appendix F** includes a discussion of those locations, and figures that show detailed maps of each pipeline route alternative.

[1] See 40 CFR 1502.14 and CEQ's 40 Frequently Asked Questions, number 1b.



Sources: Proposed Piplines, Florida Gas Transmission Pipeline, and Existing Sand Resources: ConShelf 2007; ROSS Potential Sand Source Area: ConShelf 2008; Borrow Area IX and High Volume Sand Shoal: ConShelf 2009; Longboat Key Alternative: eᵉM, Inc. 2009.

Figure 2.1-18. Longboat Key Proposed Alternative

A summary of the results of the screening is included in **Table 2.1-5**. The concentrations of sensitive biological resources do not appear to vary between the three alternatives.

Table 2.1-5. A Summary of Proposed and Alternative Port Dolphin Deepwater Port Sites and Offshore Pipeline Routes Evaluated With Respect to Selection Criteria

Selection Criteria	Proposed Site and Route Alternative	Northern Site and Route Alternative	Southern Site and Route Alternative	Proposed Site and Interconnect to Existing Gulfstream Pipeline
Operational depths	Present	Present	Present	Present
Avoidance of archeological resources	Avoids mapped resources	Avoids mapped resources but traverses areas with high concentration of mapped shipwrecks	Avoids mapped resources	Avoids mapped resources
Avoidance of shipping lanes	Avoids major shipping fairway and waterways	Crosses the major shipping fairway and Port Manatee waterway	Avoids major shipping fairway and waterways	Avoids major shipping fairway and waterways
Distance from landfall location	67.6 km (42 mi)	89.6 km (56 mi)	74 km (46 mi)	27.6 km (26 mi)
Avoidance of sand resources	Avoids most mapped resources and all permitted resources	Avoids permitted sand resources	Impacts some mapped and permitted resources	Avoids mapped resources that have not been impacted by Gulfstream pipeline
Avoidance of ODMDSs	Avoids ODMDS	Avoids ODMDS but borders disposal area	Avoids ODMDS	Avoids ODMDS
Avoidance of fish havens	Avoids fish havens	Avoids fish havens	Avoids fish havens	Avoids fish havens
Avoidance of crossing Gulfstream Pipeline	Crosses twice	Crosses three times	Avoids the Gulfstream pipeline	Connects with Gulfstream

Onshore Pipeline Alternatives. Details of the onshore portions of the Proposed Route are discussed in **Section 2.3.9**. Construction methods discussed in **Section 2.3.11** for the Proposed Route also apply to the Southern Route alternative. Both onshore pipeline route alternatives pass through equivalent land use areas and environmental resources. Construction methods would be similar for both routes. Detailed evaluation would be required to determine whether the routes resulted in different levels of environmental impacts.

Onshore, the Proposed Route would proceed east across Port Manatee property through a tidally influenced conveyance ditch through Reeder Road to just west of the CSX railroad for a total of

approximately 1,981 m (6,500 feet). At that point the pipeline would turn south on the west side of U.S. Highway 41 and proceed south for approximately 481 m (1,580 feet) through the Florida Power and Light Company (FPL) tank farm before turning east again. The pipeline would cross the CSX railroad and parallel the FPL Transmission Line right ROW across U.S. Highway 41, and end at the interconnection with the Gulfstream pipeline and the TECO pipeline within the Margaret Mock industrial property.

The Southern Route Alternative (see **Figure 2.1-16** and **Section 2.3.1**) would travel east from Port Manatee property and cross the CSX railroad and U.S. Highway 41 before heading south along the eastern side of U.S. Highway 41. The Southern Route alternative would follow the proposed route to the crossing of U.S. Highway 41 where it would turn south before crossing U.S. Highway 41 and continue to follow the Proposed Route to the interconnection station within the Margaret Mock industrial property.

Potential impacts from the two onshore alternatives appear similar. Therefore, both alternatives will be carried forward for detailed review.

In comments on the Draft EIS, Gulfstream pipeline objected to the location of the HDD entry point proposed by Port Dolphin. Gulfstream stated that the entry point was too close to its existing pipeline for safe execution of the HDD. Contrary to Gulfstream's allegations, we are not convinced that Port Dolphin's proposed HDD entry point poses an unacceptable safety risk. First, the HDD operators will have an extremely high level of control over the location and path of the drilling operation during the initial entry of the HDD where the proposed pipeline is in proximity to Gulfstream. As an HDD progresses further and further from the entry rig, there is the possibility for some amount of wayward movement; however, this should not pose a problem at the initiation of the HDD where the operators have greater control over the directional path of the drill and more precise information about the location of adjacent utilities. The further the HDD progresses along its alignment path adjacent to Gulfstream the vertical separation between these two pipelines will increase, as noted below. Second, the location of the Gulfstream pipeline is firmly established, so there is no chance that the HDD would encounter heretofore unknown Gulfstream facilities. Third, according to information submitted by Port Dolphin, the HDD entry point itself is 27 feet from the Gulfstream pipeline, and the HDD entry pit would be at least 20 feet from the Gulfstream facilities. This is within accepted industry practice.
Port Dolphin has proposed several measures in order to provide an added level of safety and to address some of Gulfstream's proximity concerns. Specifically, Port Dolphin would:

- invite Gulfstream personnel to be onsite both prior to construction (to help identify the exact location of the Gulfstream facilities), and during HDD operation;
- fence off Gulfstream's exclusive easement (5 feet on either side of Gulfstream's pipeline), thus preventing any Port Dolphin activity from encroaching within this area; and
- shore up the HDD entry pit with sheet piling or other materials to prevent soil collapse near the Gulfstream pipeline.

Gulfstream also expressed concerns over the angle and clearance of the HDD path as it crosses beneath the existing Gulfstream pipeline. However, according to information filed by Port Dolphin, the HDD path (which is a progressively deepening parabola for the onshore portion) would cross below the Gulfstream pipeline with about 75 feet of vertical separation.
Based on the FERC Staff review, the FERC Staff concluded that the HDD proposed by Port Dolphin, along with Port Dolphin's proposed additional safety measures, would be consistent with accepted industry practices. As such, the FERC Staff found Port Dolphin's proposed HDD acceptable. Therefore, no alternative HDD entry points were carried forward for detailed analysis of impacts.

2.1.5 Alternative Anchoring Methods

Installation of the mooring anchors for the two proposed offloading buoys would be one of the primary activities associated with construction of the Port having potential to cause environmental damage. There are a variety of available anchoring systems, each with its own suitability for varying environmental (e.g., seafloor, water depth, metocean) conditions, that also differ in the nature of their potential adverse impacts on marine resources associated with their installation. **Table 2.1-6** identifies the five types of systems and their primary characteristics.

Table 2.1-6. Alternative Types of Anchors

Alternative	Considerations	Characteristics
Embedment anchors	Substrate	Versatile and accommodate wide range of soils. Difficult to install in hard-bottom areas.
	Impact	Large short-term impacts due to installation. Small long-term impacts.
	Decommissioning	Recoverable on decommissioning.
Drilled and grouted anchors	Substrate	Difficult to install in sandy soils.
	Impact	Small short-term area of disturbance and noise impact during installation. Long-term loss of small benthic area.
	Decommissioning	Usually abandoned in place.
Suction piles	Substrate	Sensitive to variations in soil type.
	Impact	Small short-term area of disturbed seafloor from installation. Long-term loss of small benthic area.
	Decommissioning	Recoverable on decommissioning.
Driven piles	Substrate	Designed to suit existing soil conditions.
	Impact	Small short-term area of disturbance and short-term but large area noise impact during installation. Long-term loss of small benthic area. Hammer impacts produce high noise impulses.
	Decommissioning	Usually abandoned in place.
Gravity anchors	Substrate	Versatile, accommodates most bottom types.
	Impact	Moderate short-term impacts during installation. Moderate long-term loss of benthic area offset by potential artificial hard substrate of anchors.
	Decommissioning	Recoverable on decommissioning.

Criteria for evaluating the five anchoring alternatives were suitability of substrate, area of bottom disturbance, noise generated during installation, and recoverability on decommissioning. From an engineering design standpoint, the types of soils or substrate were generally deemed to be the major deciding factor in determining the most suitable anchor.

The five anchoring alternatives are described as follows:

- *Embedment anchors* are versatile and accommodate a wide range of soil types. As implied by the name, these anchor types are embedded in the soil by dragging them with heavy pull tugs. Thus, installation involves disturbance of the seafloor to a greater degree than any of the other

alternatives, with impacts on benthic communities and water quality as well as the noise generated by tugs during installation. They are difficult to install in areas with hard-bottom. Embedment anchors can be recovered upon decommissioning of the Port. Because of the greater seafloor disturbance, embedment anchors will not be carried forward for detailed evaluation.

- *Drilled and grouted piles* require drilling a hole in the seafloor and filling it with a pour or cast pile. Because a drilled hole must remain open for concrete to be poured into place to form the pile or for a precast pile to be lowered into the hole, it is difficult to install drilled piles in soft sand bottoms that refill quickly unless some casement remains in the hole after drilling. Drilled piles are about the same size as driven piles. Because the sediment in the proposed and alternative site areas would not support drilled and grouted piles, they are not carried forward for detailed evaluation.
- *Suction piles* require specific depths and types of soils, but disturb a limited bottom area. They are installed by placement on the seafloor and drawn into the soft sediments by lowering the pressure beneath them. They require a minimum of 7.6 m (25 feet) of surficial soils, but are highly reliable. Once installed, suction piles do not protrude above the seafloor. Suction piles are carried forward for detailed evaluation.
- *Driven piles* are the most versatile anchoring system, being effective in almost any type of soil condition, and they have the smallest area of bottom disturbance of the four alternatives. The repetitive hammer blows needed to drive the piles into the sediment create substantial sound pressure waves that have been demonstrated to cause behavioral changes and physiological damage to marine mammals' hearing ability, depending on the proximity to the Port and the magnitude of the noise. Driven piles are proposed, and thus carried forward for detailed evaluation.
- *Gravity anchors* are massive concrete objects that provide a stable anchor by their weight rather than by embedment in the seafloor. These are rapid and easy to install and recover at the time of facility decommissioning, but would create a large obstruction on the seafloor for the life of the Project. Because gravity anchors impact a larger area of the seafloor they are not carried forward for detailed evaluation.

2.1.6 SRV Propulsion Alternatives

There are two main SRV propulsion alternatives: turbine drive and diesel drive. Turbine drive uses either steam produced in boilers or the exhaust of a natural gas turbine to drive a turbine. Many conventional ship propulsion systems use steam turbines for propulsion. If a steam turbine were used for propulsion, the steam boiler would also be available for producing steam as a source of vaporization heat. Alternately, if the propulsion system boiler is separate from the vaporization system, then the propulsion system boiler can be shut down when the SRV is docked at the port. If a gas turbine propulsion system is used, then a separate boiler would be used to supply steam to the closed-loop vaporization system.

If diesel drives were used, then either slow-speed diesel engines could be used to directly drive the propulsion system, or high speed diesel engines could be used to generate electricity that would drive electric motors to propel the vessel.

The first alternative considered was gas-fired propulsion steam boilers which would provide steam to turbine generators to propel the vessel while underway, and then would be used to supply steam to heat the LNG in the vaporizer heat exchangers when the SRVs were at the port. The boiler steam would also be expanded through turbine generators to make electricity to run the LNG pumps and to meet ship hoteling requirements. The steam boiler propulsion system is proven technology and used on many classes of vessels throughout the world. However, the water use required to cool the steam turbines is

greater than the water required for the diesel engine alternatives and the air emissions are higher. Therefore, the steam boiler alternative was not carried forward for detailed analysis.

The second dual purpose alternative was gas-fired turbines to propel the vessel. At the Port during vaporization the turbines would be fired to generate electrical power and waste heat from electrical generation would be recovered to vaporize LNG. Gas turbine designs have been used in military applications, but currently there are no LNGCs operating with gas turbine propulsion, and there have been documented failures of gas turbine drive systems. The gas turbine propulsion system is considered a novel concept and is not proven for this SRV application (Chang et al. 2008; MPT Consultancy). The gas turbine option was not carried forward for detailed evaluation because of the reliability issue.

The slow-speed diesel propulsion system alternative would require separate propulsion and LNG vaporization systems. There would be no integration between systems. The slow-speed diesel would not be capable of burning boil-off gas from the LNG storage tanks, therefore marine diesel oil would have to be burned, resulting in higher air emissions. The heat required to vaporize LNG would be supplied by gas-fired auxiliary marine boilers. Electrical requirements would be supplied by the generation engines. Because the air emissions generated by the slow-speed engines are higher than the high-speed engines and other impacts of the two systems are similar, the slow-speed diesel generator alternative was not carried forward for detailed analysis.

The high-speed diesel propulsion system alternative would require separate propulsion and LNG vaporization systems. There would be no integration between systems. The high speed diesel would be capable of burning boil-off gas from the LNG storage tanks, therefore marine diesel oil would be burned only during ocean transit. Boil-off gas would be burned while the vessel is at the Port, resulting in lower air emissions. The heat required to vaporize LNG would be supplied by gas-fired auxiliary marine boilers. Electrical requirements would be supplied by the generation engines. The high-speed diesel alternative was carried forward for detailed evaluation.

A summary of the emissions and water use for the steam boiler and diesel engine alternatives is presented in **Table 2.1-7.**

Table 2.1-7. SRV Propulsion Alternative

System Type	Water Use (MGD)	NO_x (tpy)
Boiler [1]	27–90	100–185
Slow-Speed Diesel [2]	5–7	62
High-Speed Diesel [3]	5–7	45–52

Sources:
1. FERC 2008b; USCG and MARAD 2007b; USCG and MARAD 2007d
2. Port Dolphin 2007j; USCG and MARAD 2007b
3. USCG and MARAD 2003; USCG and MARAD 2007b; USCG and MARAD 2007c

2.1.7 LNG Vaporization Alternatives

There are three available heating methods used to vaporize the LNG: burning part of the vaporized LNG, using the surrounding seawater to warm the LNG, or using the surrounding air to warm the LNG. Any of these warming media can be used directly to warm LNG or can warm an intermediate fluid that then warms the LNG. Burning part of the LNG and no use of ambient seawater is generally referred to as a closed-loop system. Using the surrounding seawater in a once-through system to warm the LNG is generally referred to as an open-loop system. Using ambient air to warm LNG is referred to generally in

this EIS as ambient air vaporization (AAV). There are several commercially tested vaporization systems currently used as heat exchangers to vaporize LNG: submerged combustion vaporizers (SCVs), shell-and-tube vaporizers (STVs), open rack vaporizers (ORVs), and ambient air vaporization (AAV) equipment with or without backup heating systems (usually SCVs). Vaporization systems can be configured in numerous ways to use one or more of the available heat sources to vaporize LNG.

In response to public comments a vaporization system designed by Wheaton Process Systems was evaluated. The system would use the warm seawater surrounding a deepwater port as the warming source to vaporize the LNG, but it does not pump the water through a heat exchanger system. Instead, an intermediate fluid is circulated through a set of heat exchangers that would be submerged in the seawater. The large surface area of the heat exchangers exposed to the seawater would allow for heat transfer from the seawater into the LNG. The colder seawater would flow away from the heat exchanger array due to the reduced buoyancy of the colder water and the motion of the ocean currents at the site (Engdahl 2008). The Wheaton vaporizer system would require a large, fixed array of heat exchangers making it technically unfeasible for the SRV or FSRU vessel-based port system alternatives. Also, there have been no installations of the proposed technology in similar applications in either demonstration projects or commercial applications. Therefore, the technology is not considered commercially available. The Wheaton Process System vaporization system is not carried forward for detailed evaluation because it is not technically feasible for the port designs and has not been demonstrated to be commercially available.

2.1.7.1 Closed-loop Systems

SCV uses a burner that exhausts the hot combustion gases through a water bath to heat the water. The water then flows up through a tube bundle containing the LNG and vaporizes it. The water bath must be able to circulate over a weir and return through a downcomer to be heated again by the combustion gases. SCVs are suited for fixed port designs, such as a fixed platform, GBS, or artificial island because these port designs would provide the stability required to prevent the water bath from sloshing over the weir and disrupting circulation. However, SCVs have been proposed for use on an FSRU for the Cabrillo Port Project.

A STV can also use steam to heat an intermediate fluid, such as propane or a water-glycol mixture. The intermediate fluid is then circulated over a tube bundle containing the LNG. The heated intermediate fluid vaporizes the LNG and is returned to the steam heat exchanger to be reheated. The intermediate fluid system can be completely enclosed. STVs can be used on either fixed or floating port designs, as the use of an intermediate fluid lessens the system's vulnerability to sloshing. Closed-loop STVs are being used on the Northeast Gateway project.

2.1.7.2 Open-loop Systems

In an ORV, seawater is used as the heating mechanism; the seawater is pumped to the top of an open water box that distributes it along the vaporizer. The water spills over the top of the water box and down a system of finned tubes containing LNG. As heat from the seawater vaporizes the LNG, the seawater is cooled. This system can only be used on a fixed port design such as GBS, fixed platform, or artificial island because the system must be stable to prevent the water bath from sloshing over the weir and disrupting circulation. It cannot be used on a LNGC, such as the STL/SRV design proposed by Port Dolphin or an FSRU, because the rolling of the vessel does not provide a stable platform.

Alternatively, a STV can use seawater to heat the intermediate fluid. A STV using seawater as the heat source can be used on any port design. The seawater is pumped through a heat exchanger to an intermediate fluid system, such as propane or a water-glycol mixture. The intermediate fluid is then circulated over a tube bundle containing the LNG. The heated intermediate fluid vaporizes the LNG and

is returned to the seawater heat exchanger to be reheated. The intermediate fluid system can be completely enclosed. Open-loop STVs are being used on the Gulf Gateway project.

2.1.7.3 Ambient Air System

When ambient air is used to warm the LNG, air is blown down through finned tubes that contain LNG to vaporize the liquid. This process requires a relatively large surface area for the air movement to warm the LNG, and sometimes supplemental heating depending on the ambient air temperatures. This system can fit only on a facility with sufficient deck space and stability for large structures, including GBS, fixed platform, and artificial island. It cannot be used on a LNGC, such as the SRVs that would service the STL design proposed for Port Dolphin.

The FSRU design can accommodate AAV technology. Because the FSRU would not transit open ocean except under controlled conditions when being brought to the Project site, it would not be subject to the conditions that would prevent use of the AAV system. An FSRU could be designed that would be stable under the projected site conditions at the proposed Port Dolphin site.

The applicant for the Ocean Way Project in California has proposed to use purpose-built vessels called Regasification LNG Carriers (RLNGCs) that would use AAV as the principal heat source for vaporization. Each vessel would have AAV modules installed to supplement heat available from the propulsion and power generation waste heat systems. The AAV and waste heat recovery would be capable of providing 90 percent of the energy required to vaporize the LNG at rates comparable to those required for Port Dolphin. Supplemental heating from combustion of boil-off gas would also be necessary.

However, the Ocean Way RLNGCs would be designed for operation at or near the port site. LNG would be transported from its origination points to the port site in conventional LNGCs and transferred to the RLNGC. The RLNGC would then moor with an unloading buoy, vaporize, and send out the natural gas. The RLNGC would be limited to a top speed of 15 knots, and it is not clear from available information if it would be capable of open ocean crossings during heavy weather conditions because of the heavy topside structures required to house the AAV modules (OceanWay 2007).

Any port design will require electrical generators to provide electrical power to the systems at the port. Systems for generating electricity that are currently available on SRV or FSRU designs include steam turbine and diesel engine powered generator units. Both types of generators result in waste heat that must be removed from the turbines and generators. The applicant for the Calypso Deepwater Port project has proposed to use a specially designed vessel that would be moored semi-permanently at one of two proposed mooring buoys. This vessel, the Special Regasification Ship (SRS), would employ a specially designed engine cooling system that recirculates the cooling water through heat exchangers for the vaporization system. Therefore, the waste heat is used to supply heat for vaporizing the LNG. Because this is a specially designed system, it would not be available on the SRVs that would service the Port Dolphin STL buoys. However, if the FSRU design was selected, this system could be used. Therefore, the Closed Engine Cooling System has been carried forward for review as an alternative associated with the FSRU vaporization system.

2.1.7.4 Environmental Considerations

Water-Warmed STV. For systems that use water as the energy source for vaporizing the LNG, there are direct environmental impacts from the intake of seawater. Marine organisms are entrained with the water in the intake system, or become impinged on the screening devices used to keep marine life out of the system. Eggs and plankton are entrained in the warming water and are likely to be killed by the thermal

and mechanical forces as they pass through the system. As noted above, the use of fuel to power electrical generators also creates air emissions. In previously filed projects where seawater was used to vaporize the LNG (e.g., Gulf Landing, Compass Port, and Beacon Port), the vaporization equipment would be located on a deck high above the sea surface. Water would be pumped up to the equipment deck level, which would require substantial amounts of power. This would result in additional air pollution from the turbine generators, thus reducing the air quality advantages that seawater vaporization system appeared to have. Therefore, shell-and-tube vaporizers can result in higher air emissions than the ambient air vaporizer if the vaporization equipment is located far above the sea surface. In another application of open-loop STV proposed by the BOET project, the open-loop STV would be located beneath the water surface, and thus the power required to pump seawater to the vaporization equipment would be less, and the advantages of using seawater to warm LNG in terms of impacts on air quality would be more evident.

STV open-loop systems would create greater marine impacts than closed-loop systems. Based on the seawater throughputs for open-loop STV used by Gulf Gateway in the GOM (76 MGD to vaporize 690 MMscfd) (USCG and MARAD 2003), Port Dolphin would require an open-loop system of at least the same volume for LNG heating purposes. Therefore, since the maximum vaporization rate of 1,200 MMscfd is higher for the proposed Project than at the Gulf Gateway Project, the warming water flow would be approximately 132 MGD. Thus, either seawater intakes would have to be proportionally larger, threatening vessel safety, or the intake velocity would have to be higher. Warming water from the open-loop system would be discharged at a temperature of 11 to 17 °C (20 to 30 °F) cooler than ambient except during periods of low water temperatures when supplemental heating would be required. (USCG and MARAD 2003). Marine organisms (eggs and larvae) would be entrained in the once-through system, resulting in 100 percent mortality caused by passing through the system, the temperature change, and the anti-fouling agents applied to the open-loop warming water system to retard marine growth. Secondary biological impacts are fish impingement on intake screens and cold water discharge plume from the open-loop STV system. Therefore, although open-loop STV capabilities are available for the SRVs and FSRU, they would not be considered for use at Port Dolphin due to potentially greater impacts on marine ecosystems than closed-loop systems and AAV.

Fuel-Fired STV. When a fuel source such as natural gas or diesel is used to create the heat from within the vaporizer system, the result is high air emissions in the form of nitrogen oxide (NO_x) and volatile organic compounds (VOCs) that could contribute to degradation of the air quality. There would be no seawater for vaporization, but water would be required for cooling the electrical generating equipment. This cooling water intake would result in direct mortality to marine life due to entrainment of eggs and plankton in the intake, and due to the discharge of the cooling water at elevated temperatures.

The Calypso Project (Application withdrawn) proposed to use a closed-loop vaporization system on the SRS that would usually be moored at one of the two proposed buoys. The SRS is custom-designed to include a system capable of vaporizing the LNG in a closed-loop system and to cool the electricity-generating engines. The system would use generator waste heat as the warming energy to vaporize the LNG. The SRS technology would be owned by Calypso and therefore, Calypso can specify the design. The Transfer and Regasification Vessel (TRV) that would service the Calypso Project would not be owned by the Calypso applicant, and therefore Calypso has proposed to use a commercially available vessel design. The vaporization system design of the TRV is virtually identical to the SRV proposed by the Applicant, and Calypso has proposed to employ a closed-loop vaporization system the same as the one proposed for Port Dolphin (USCG and MARAD 2007a). The SRS vaporization technology design is not available for the Port Dolphin SRVs and, therefore, SRS vaporization technology is not a viable alternative for the SRV design. However, with the FSRU design, the closed-loop cooling water system could be used. Even though there would be no water intake for the FSRU, the LNGCs that service the FSRU would require cooling water. Since most current generation LNGCs are steam-powered, the

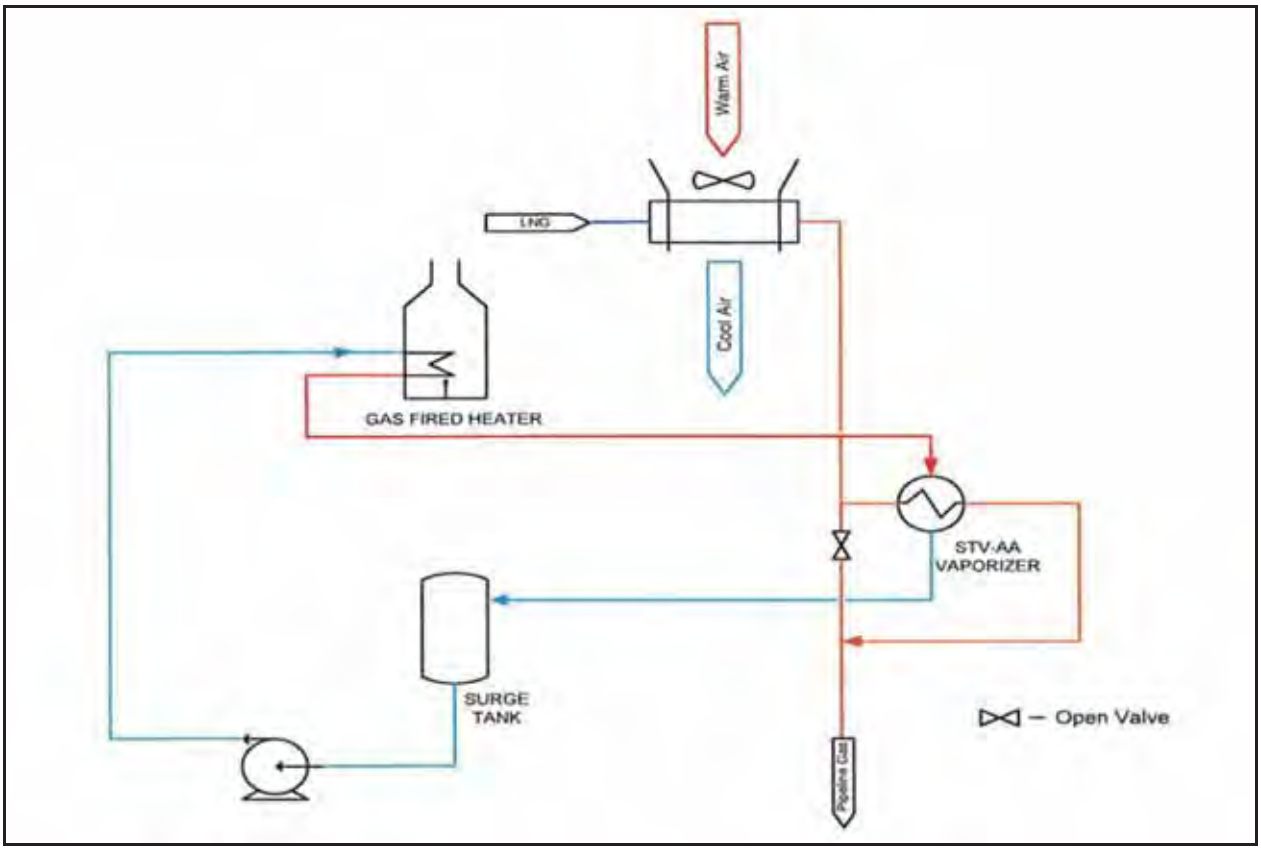
propulsion boilers and power generation systems would be required while the LNGC is berthed at the port. The LNGCs are estimated to have a seawater intake that averages 13.75 MGD, based on the time required to offload their cargo. This would limit the reduction in impacts on marine resources (USCG 2007a).

AAV with Supplemental Heating. AAV would not require seawater for vaporization, but would require water for cooling electric generating equipment. In addition, the LNGCs servicing the FSRU would be conventional LNGCs, and would also require cooling water. The FSRU port design would be served by conventional LNGCs. Therefore, in addition to the cooling water required for port electric-generating equipment cooling, the LNGCs would also require cooling water for onboard generating equipment and propulsion auxiliaries. An average of three LNGCs per week would be required to maintain the design send-out rate for the Project. Based on reported cooling water intakes for LNGCs, and assuming that the LNGC would be moored at a port for 24 hours, a total of 57 MGD would be used by the LNGCs for cooling. The Port would require 135 LNGC visits for a total of 7,695 million gallons of cooling water intake per year. In addition, the Port would use 5.5 MGD for cooling water. Therefore, a total annual cooling water use of 9,702.5 million gallons would be required for FSRU system cooling and LNGC water intake, which exceeds the 2,007 million gallons used by the SRV design. For any design, the volume of ballast water intake would be dependent on the volume of LNG vaporized, so all port designs would use approximately the same volume of ballast water (FERC 2008b).

AAV is not technically feasible without supplemental heating in addition to the ambient air. Supplemental heating would require a closed-loop STV, reducing some of the benefits of using AAV as the vaporization system. Also, as the ambient air cools, the moisture in the air is condensed, and volumes of fresh water are generated. Some of this water can be used for normal shipboard uses such as potable water or firewater system testing, but most of the fresh water would be discharged overboard at temperatures lower than the ambient seawater.

2.1.7.5 LNG Vaporization Alternatives Conclusion

Based on the initial screening process and the comparisons of impacts from other projects that did detailed evaluations of open- and closed-loop vaporization systems (USCG and MARAD 2006, 2007b, 2007c, 2007d), it is clear that the impacts from the proposed closed-loop STV system would have lower overall environmental impacts on water quality and marine resources than an open-loop STV system. Therefore, only the closed-loop STV alternative will be evaluated in detail for use with the SRV port design. A schematic of the STV design can be found in **Figure 2.3-6**. For the FSRU port design, AAV will be considered in detail. A schematic of the AAV system with supplemental heat is shown in **Figure 2.1-19.** The FSRU design can support AAV, and the potential reduction to impacts on marine resources supports its evaluation. **Table 2.1-8** Vaporization Alternatives summarizes the criteria and analysis presented above.



Source: ASIG 2007a

Figure 2.1-19. AAV with Supplemental Heat Vaporizer Process Flow Chart

Table 2.1-8. Vaporization Alternatives

	SCV with Supplemental Heat	STV	ORV	AAV with Supplemental Heat
Vaporization Sources	Water	LNG	Water, LNG	Air, LNG
Substrate required for Vaporization System	Platform for water source, LNGC for LNG source	LNGC	Platform	Platform
Air emissions (Comparison)	++++	++++	+++	+
Water intake (comparison)	+++	+++	++++	+
Water Discharge (comparison)	+	+	+	++++

Source: OceanWay 2007, USCG and MARAD 2003, USCG and MARAD 2007a, ASIG 2007a

Notes: + = lowest possible impact, ++++ = highest possible impact

2.1.8 Alternatives for Marine Life Exclusion Systems

The Applicant has proposed to obtain engine cooling water (for the engines powering the revaporization process) via two sea chests located below the waterline. Openings to the sea chests would each measure 1.5 m by 2.0 m (4.9 feet by 6.56 feet).

Selection of a marine life exclusion system must be consistent with the operational and safety considerations of an oceangoing marine vessel, since the SRVs are used to transport the LNG to the Port

and to vaporize it. The proposed design provides for a through slot intake of 0.25 inches with a velocity of less than or equal to the USEPA-recommended velocity of 0.15 meters per second (m/s) (0.5 feet per second [ft/s]). It provides for exclusion of most juvenile fish.

Past deepwater port applications have considered aquatic filter barriers and cylindrical wedgewire screen barriers of variously sized gap openings and heights, resulting in the selection of 0.25-inch gap screens. For shipboard applications, neither cylindrical wedgewire screens nor fabric filters are practical. If smaller slot sizes are used, either the intake velocity must be increased, which would threaten impingement of a greater number of marine organisms, or the hull openings would have to be enlarged, threatening vessel integrity.

Since the proposed intake structure design would result in an intake velocity of less than or equal to 0.15 m/s (0.5 ft/s) and alternative technologies did not offer increased protection for marine organisms without jeopardizing vessel integrity, the Applicant's proposed intake structure design is the only alternative carried forward for detailed evaluation.

2.1.9 Alternative Biocide Systems

The Port as proposed would use approximately 9.5 MGD of seawater to cool the engines producing power for the LNG revaporization process and hotel loads. The water would also be used for ballast control as the LNG cargo is vaporized. When the SRVs are at the Port, the Applicant has committed to ensuring that the installed biocide system that would be used when the SRVs are underway in international waters would not be operated while the SRVs are operating at the Port. This results in no use and no discharge of biocide at the Port. All alternatives would result in some discharge, either at the port site or at a land disposal site. This would result in greater environmental impacts than not using biocide. Therefore, no alternative biocide systems have been evaluated.

2.1.10 Alternative Pipeline Construction Methods

Conventional pipeline construction methods include alternatives for the placement of the pipeline in offshore and onshore areas, and alternatives in offshore vessels used to connect pipeline sections into a continuous pipe and lay the pipeline on the seafloor. For the proposed Project and alternative locations, the water depth never exceeds 61 m (200 feet), and therefore the pipeline must be buried to at least 1 m (3 feet) under the bottom grade to comply with MMS requirements. Alternative methods to bury the pipeline include dredging, plowing, jetting, and directional drilling. In areas where a hard-bottom would not allow for the burial of the pipeline, concrete mattresses would be placed on top of the pipe to protect it from hazards. Dredging involves removing material from the bottom to construct a trench for the pipeline, laying the pipeline in the trench, and then returning the dredged material to cover the pipeline or allowing natural currents to refill the trench. Plowing involves laying the pipeline on the bottom and then dragging a plow along the seafloor using the pipeline to guide the plow. The plow simultaneously casts the bottom sediment to the sides of the trench and lowers the pipeline into the trench. After the pipeline is placed in the trench, the plow is reversed and dragged along the trench, refilling the trench with the material cast out of the trench during plowing. Jetting involves using a hydraulic jet of ocean water to blast the sediments out of the trench, and then lowering the pipeline into the trench. Directional drilling requires creating a space to access the bottom with a drilling rig. A pilot hole is then drilled sideways from the point of entry to an exit point that also requires access to surface equipment. After the pilot hole is drilled, it is reamed to the necessary size and the pipeline is pulled through the hole.

The placement of concrete mattresses, dredging, plowing, and jetting would all result in resuspension of sediments and impacts on benthic communities from redeposition of sediments in benthic areas.

Resuspension of sediments would also impact water quality. Without additional analysis, it is not possible to determine which of these methods would result in lower impacts.

Directional drilling would minimize impacts due to resuspension of sediments, but the process is not suitable to all offshore areas. It would be impossible to complete a single directional drill from the Port site to the onshore interconnection point. Therefore, a series of drilled segments would be required. Financial and technical issues would preclude this option. However, as with the nearshore to onshore transition that the Applicant has proposed to directional drill, some pipeline segments could be installed using directional drilling if particularly sensitive habitat areas would be traversed.

Construction of the pipeline is likely to include a combination of three techniques for pipeline installation. Jetting has not been proposed by the Applicant. Therefore, the dredging, plowing, and directional drill alternatives will be considered in the detailed evaluation.

2.2 No Action Alternative

The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the License, or the Governor of an adjacent coastal state would disapprove the Project under the DWPA, or the Applicant could withdraw the License application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, identified during construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers could have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

No onshore LNG facilities exist or are being proposed that target the west-central Florida market, but several onshore and offshore projects have been licensed or proposed that would provide additional supplies of natural gas to the interstate pipelines that serve Florida. Proposed onshore and offshore facilities are projects independent of each other (i.e., they are not mutually exclusive); therefore they are not considered to be alternatives to each other. Onshore facilities are discussed under the No Action Alternative, since they could be developed regardless of the outcome of any proposed DWPA application.

As described in **Section 1.3**, projected natural gas demand in west-central Florida is expected to exceed the currently available supply.

If natural gas is not brought into the region by the proposed Project or other similar action, short-term natural gas shortages and increased reliance on other fuel sources could occur to make up the difference, especially for use in electricity generation. Many natural gas power plants have the option of substituting fuel oil, should natural gas become unavailable or prohibitively expensive. The projected national increase in petroleum product consumption between 2002 and 2025 is similar to that for natural gas. Consequently, there is unlikely to be a surplus of petroleum fuel that could readily provide a cost-effective alternative to natural gas without significant new discoveries of crude oil.

It is possible that existing natural gas infrastructure supplying the proposed market area could be developed in other ways unforeseen at this point, including the further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, wind, solar, hydro, or biomass to compensate for the reduced availability of natural gas. It is also possible that energy conservation could partially reduce the demand for natural gas, as discussed in **Section 2.2.2**.

2.2.1 Energy Source Alternatives

Use of the No Action Alternative could lead to increased use of other fossil fuels if energy demand is more than natural gas supply. Natural gas is the cleanest burning fossil fuel. Increased use of other fossil fuels with existing emissions-control technologies would lead to increased emissions of combustion by-products, including carbon dioxide (CO_2), sulfur dioxide (SO_2), and NO_x (see **Table 2.2-1**).

Natural gas combustion generates 34 to 52 percent less CO_2, than conventional fuels such as oil or coal. Other emissions from natural gas combustion are also significantly lower than those from oil or coal. Thus, the use of other fossil fuels in place of natural gas would increase atmospheric pollution and waste volumes, and would incur secondary impacts associated with production (e.g., coal mining and oil drilling), transportation (e.g., oil tankers, rail cars, and pipelines), and refining.

Table 2.2-1. Estimated Air Emissions by Fossil Fuel Type for Electric Power Generation

Fossil Fuel Type	CO_2 (lb/kWh)	SO_2 (lb/kWh)	NO_x (lb/kWh)
Coal	2.1	0.01	0.008
Oil	1.6	0.01	0.002
Natural Gas	1.0	0.000007	0.002

Source: EIA 2004

Notes: Estimated emissions are based on total emissions and total electrical power production for each fossil fuel type, as reported in USEPA's Annual Energy Review 2003.

lb/kWh = pounds per kilowatt hour

Currently, there are several programs at various stages of research, development, and deployment to convert coal to clean-burning gaseous products and to control pollutants, including CO_2, from the direct combustion of coal. Many of the technologies are promising but none have been demonstrated at commercial scales. The potential for these technologies to replace natural gas is unknown.

Other traditional long-term fuel source alternatives to natural gas for electric generation are nuclear power, hydropower production, and development of renewable energy sources. FPL has announced its intention to license and construct new nuclear units at its existing Turkey Point site. FPL also estimates that the development and review of the application would take 6 years (FPL 2008). The licensing phase would be followed by construction of the units, which would add additional years onto the process before

new generation could be brought on line. Because of permitting, cost considerations, nuclear waste disposal, and potential public concerns, this estimate might be optimistic (FPL 2008). Therefore, new sources of nuclear power are unlikely to appear in the near future. It is also unlikely that significant new hydropower sources could be permitted and brought online in a timeframe as a reliable alternative to the LNG provided by the Project since there are no viable hydropower resources in Florida.

Technology is improving and costs are declining for renewable energy (e.g., wind, solar, and biomass), the percentage of national electricity generated from nonhydropower renewable energy sources is projected to increase from 2.2 percent of domestic energy use in 2002 to 3.7 percent in 2025 (EIA 2004). However based on EIA studies, there is little potential for developing wind power on or off the coast of Florida (EIA 2006b). Several programs are underway to develop methods for generating commercial quantities of hydrogen as a transportation- and electricity-generating fuel. Consideration has been given to generating hydrogen at remotely sited renewable energy complexes and transporting the hydrogen to high use areas. While this is in the early stages of research, if hydrogen eventually becomes a widely used fuel, then the mechanisms for importing it into the Florida market would involve environmental impacts that cannot be estimated. Consequently, the quantity of energy generated from nonhydropower renewable energy sources is not likely to provide a reasonable alternative to an increased natural gas supply.

Another alternative energy source would be traditional non-LNG-derived natural gas. While natural gas production is important to the overall supply of energy nationally, production levels are not expected to rise in the short term, except from the Arctic region and unconventional sources (e.g., shale, tight sands, and coalbed methane) in the Rocky Mountain region. Given a projected increase in natural gas demand in the Rocky Mountain region itself, these unconventional sources would not provide a reasonable alternative to the Project. Likewise, natural gas from the Arctic region is not a reasonable alternative because those supplies alone would be insufficient to meet projected increases in demand.

The National Petroleum Council's (NPC) September 2003 publication, *Balancing Natural Gas Policy*, determined that traditional North American producing areas will provide 75 percent of long-term needs for natural gas in the United States, but will be unable to meet projected demand. The NPC study found that the overall level of indigenous production will be dependent on industry's ability to increase its production of nonconventional gas (i.e., gas from tight formations, shales, and coalbed methane).

The Gulfstream Pipeline has recently announced an "open season" to assess the demand for additional capacity on the pipeline. This would potentially make additional supplies from both shore-based and deepwater LNG ports available in addition to the domestic supplies already transported in the Gulfstream pipeline system. At this time there is little available information on the potential size of a proposed expansion or on the attendant environmental impacts. For the expansion to affect the supply proposed for the Project, the Gulfstream Pipeline capacity would have to effectively double. It is doubtful that this could be achieved without construction of additional pipeline and supporting infrastructure including compression. Expansion of the Gulfstream Pipeline would not contribute to diversity of natural gas supplies since the gas would be from the same GOM sources that currently supply the pipeline and would therefore be vulnerable to severe weather outages and other supply disruptions.

2.2.2 Energy Conservation Alternatives

Energy conservation and increased efficiency in energy production have been a component of the national energy agenda since the 1973 Oil Embargo. Energy conservation can play a critical role in the future of the United States energy sector, however, growth projections continue to indicate that the demand for energy, and specifically natural gas, will outstrip cost-effective programs designed to stimulate energy conservation. For example, the Oak Ridge National Laboratory analyzed data from the DOE's State

Energy Program. The State Energy Program is a federally funded, state-based program administered by the DOE (the only such program administered by the DOE) that provides financial and technical assistance for a variety of energy efficiency and renewable energy activities. The Oak Ridge National Laboratory determined that the program resulted in an estimated annual energy savings of approximately 41 trillion Btu (Schweitzer and Tonn 2005). To put this amount of energy in context, the United States consumed 98 quadrillion Btu of total energy in 2002, roughly 2,400 times the 41 trillion Btu of energy savings reported by the Oak Ridge National Laboratory.

In the Florida Energy Plan several energy conservation and energy efficiency initiatives are discussed. These include The *Green Lodge* guidelines and designation for hotels; the *Rebuild America* program in partnership with Federal and local commercial, governmental, and public-housing officials to foster energy efficiency in buildings; and the *Florida Energy Conservation Assistance Program* that provides energy surveys for state and municipal governments, small business, agricultural buildings, and the hospitality industry. Investor-owned, municipal and cooperative utilities can recover investments in energy conservation that are required to meet numeric goals established by the Public Services Commission. The goals set in 2004 were lower than goals set in 1999 for three reasons: the Florida building code contains increased minimum energy efficiency levels, limiting the amount of incremental savings from utility sponsored programs; many utility demand-side management (DSM) programs have reached a saturation in participation levels; and the relatively low cost of new generating units has reduced the cost-effectiveness of several DSM programs (FDEP 2006a).

In summary, existing energy conservation programs are unlikely to fully offset the projected growth in demand for energy, and a corresponding demand for natural gas, in west-central Florida or nationally. Continued economic growth, particularly growth of electricity demand, throughout the United States will lead to increased natural gas use, despite programs to encourage energy conservation. In its *Review of Ten Year Site Plans for Florida's Electric Utilities* (FPSC 2006), the Florida Public Service Commission (FPSC) noted its approved increase in DSM programs. However, the Commission notes that a balanced fuel supply is necessary. Thus, energy conservation alone would not preclude the need for this Project.

2.2.3 Potential LNG Import Facilities

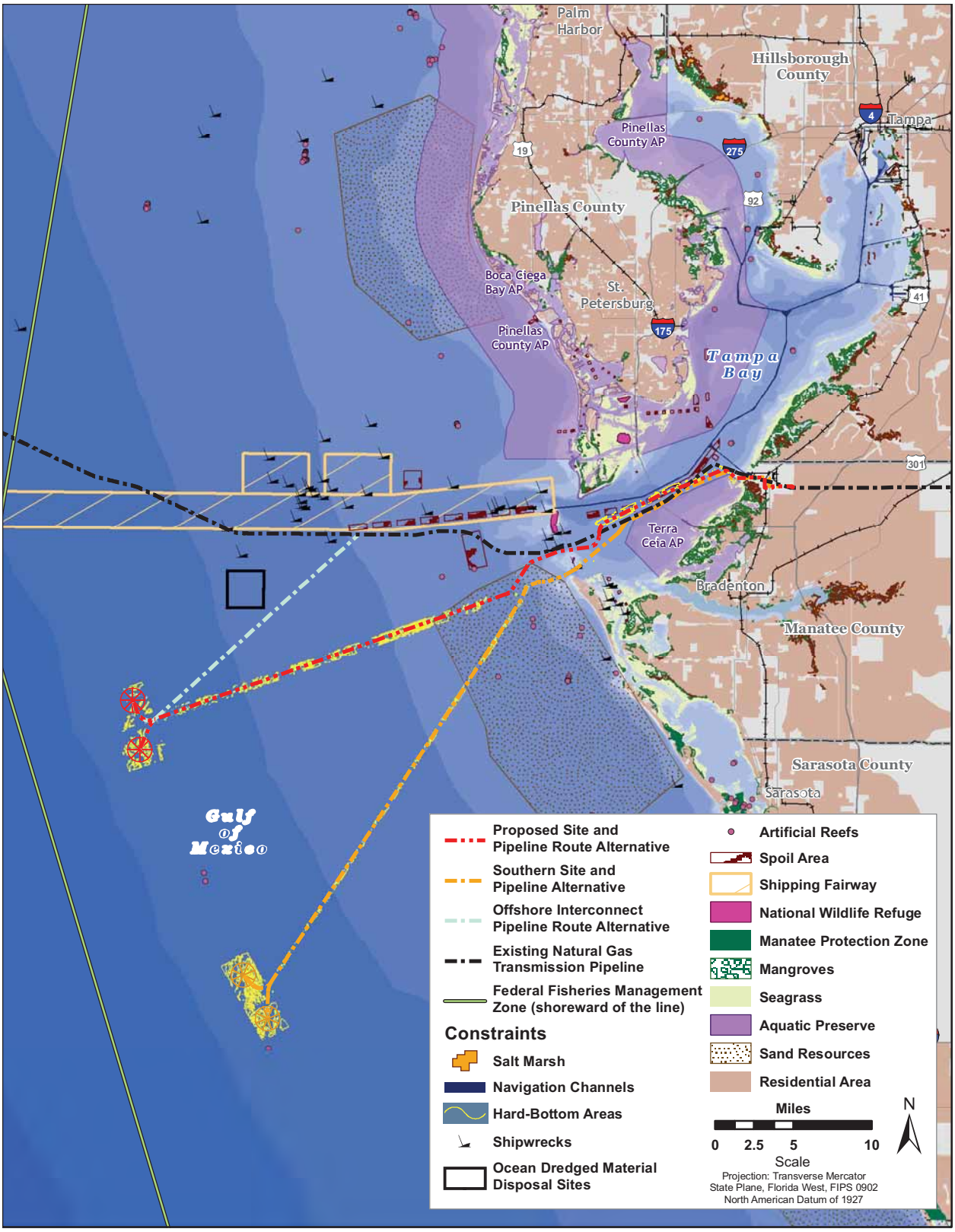
Numerous LNG import terminals are proposed for the GOM area of the United States. Currently there are no onshore LNG facilities proposed in Florida. There are several onshore LNG facilities proposed in the GOM, and the Elba Island, Georgia, LNG Terminal has two approved expansions. However, any revaporized natural gas from any of the onshore facilities approved or proposed would have to be transported to west-central Florida through new or existing natural gas transmission pipelines. The proposed expansion of the Gulfstream Pipeline is discussed above. There are currently no other pipeline expansions proposed. Therefore, construction of additional onshore LNG facilities is not considered as viable alternatives to the proposed Project.

The Bienville and MPEH™ Projects are discussed in **Section 6**, as foreseeable actions.

2.3 Detailed Description of the Project

2.3.1 Overview

The Applicant proposes to construct, own, and operate a deepwater port, named Port Dolphin, in the Federal waters of the OCS in PB blocks: PB545, PB546, PB547, PB548, PB504, PB505, PB506, PB507, PB463, and PB589, approximately 45 km (28 mi) southwest of Tampa, Florida, in a water depth of approximately 30.5 m (100 feet). See **Section 2.3.2** for a discussion of lease blocks and the overall site plan. The proposed location of the Port is shown in **Figure 2.3-1**, and a nearshore location diagram of the



Source of Proposed Pipeline: ConShelf 2009. Source of Southern Pipeline: ConShelf 2007.

Figure 2.3-1. Port Dolphin Offshore Project Location Diagram

Port is shown in **Figure 2.3-2**. The Port would be connected to existing onshore natural gas distribution pipeline systems in Manatee County, Florida, as shown in **Figure 2.3-3**.

The Port would be capable of mooring SRVs with capacities of either approximately 145,000 m^3 or 217,000 m^3. Up to two SRVs would temporarily moor at the Port by means of an STL buoy system. Two unloading buoys would be separated by a distance of approximately 5 km (3.1 mi). The unloading buoys would moor each SRV on location throughout the unloading cycle. Each unloading buoy would have eight mooring lines consisting of wire rope and chain. The mooring lines would connect each unloading buoy to eight anchor points consisting of driven piles or suction anchors on the seafloor. An SRV would typically moor at the deepwater port for between 4 and 8 days, depending on SRV size, vaporizer throughput, and send-out rate. The two separate buoys would allow natural gas to be delivered in a continuous flow, without interruption, by having a brief overlap between arriving and departing SRVs.

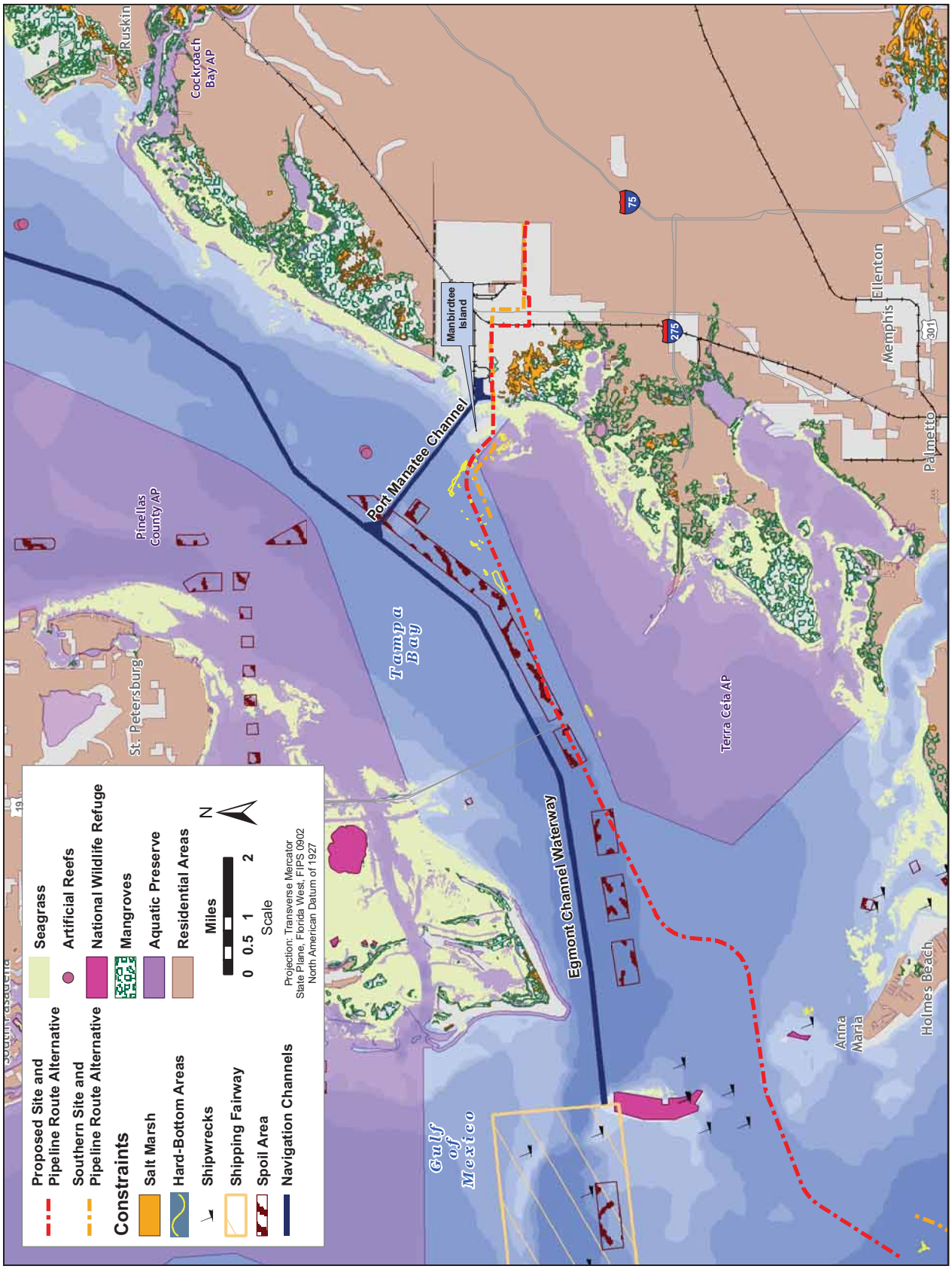
When not connected to an SRV, the unloading buoy would be submerged and held on the unloading buoy landing pad by the mooring lines with the top of the buoy approximately 18.3 to 21.3 m (60 to 70 feet) below the sea surface. A marker buoy and retrieval line would be used to locate and recover the buoy as an SRV arrives at the Port. The unloading buoy would be retrieved from its submerged position by means of a winch and recovery line. The unloading buoy would be hoisted into a trunk constructed in the forward part of the SRV where it would be located in a receiving cone. After the buoy is locked in position, unloading of natural gas would begin.

The SRVs would be equipped to store, transport, and vaporize LNG, and to meter natural gas that would then be sent out through conventional subsea pipelines. Each SRV would have insulated LNG storage tanks within its hull. Each tank would be equipped with an in-tank pump to circulate and transfer LNG, at a temperature of -160 °C (-256 °F), to the vaporization facilities on the deck of the SRV. The vaporization system would have a closed-loop, glycol/water-brine cycle with recirculating heat exchangers.

The Port would have an average throughput capacity of 800 MMscfd and a peak capacity of approximately 1,200 MMscfd. At the average throughput capacity, 50 SRV round trips per year would be required to supply the Port with LNG. However, the Port can handle up to 90 SRV round trips per year. Natural gas would be sent out by means of two flexible risers and two subsea flowlines leading to a 36-inch gas transmission line (see **Figure 2.3-2**). The gas transmission line would extend approximately 67.6 km (42 mi) to the east to landfall in Manatee County.

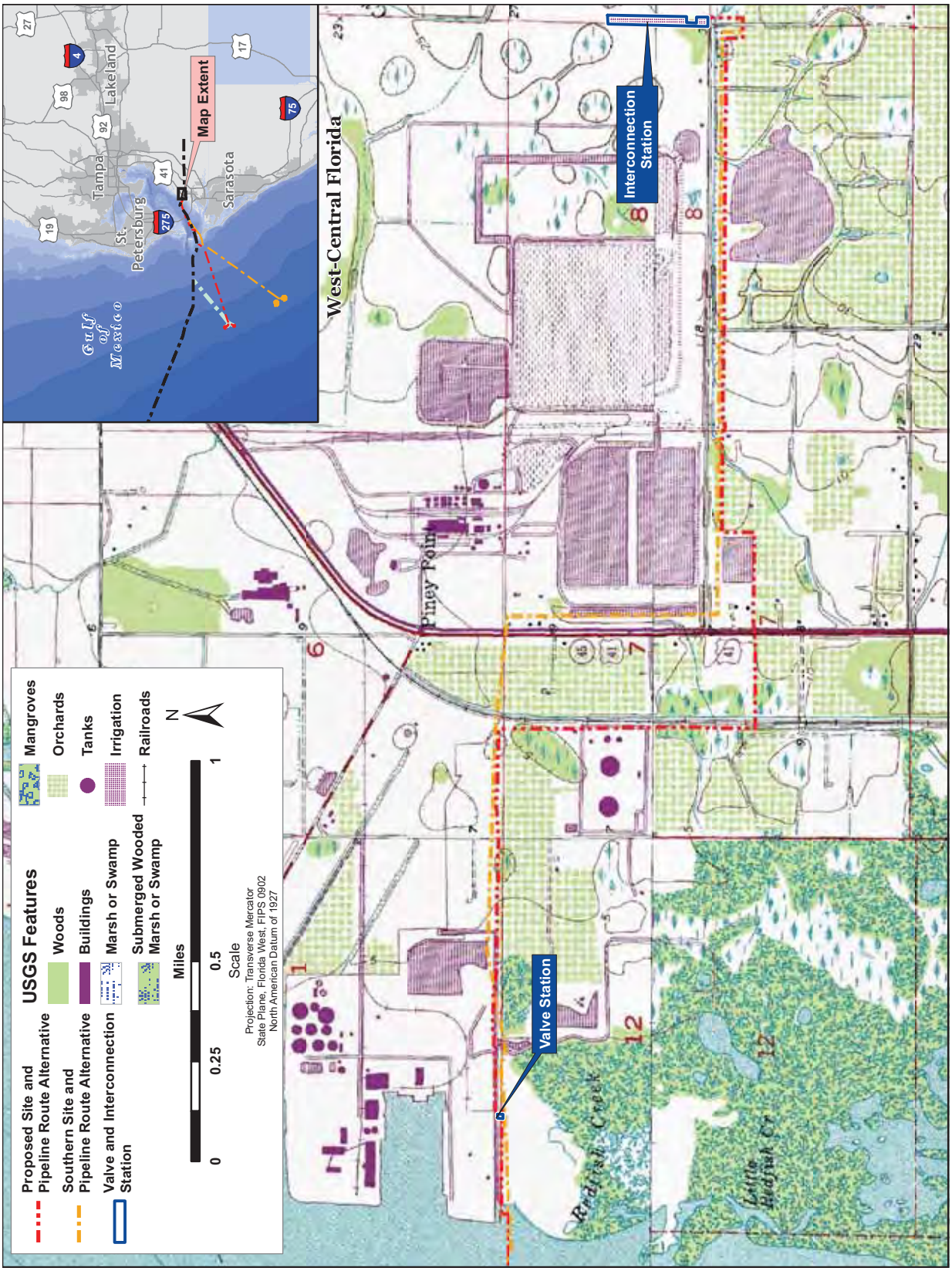
Onshore, the pipeline would proceed east across Port Manatee property through a tidally influenced conveyance ditch through Reeder Road to just west of the CSX railroad for approximately 1,981 m (6,500 feet). At that point the pipeline would turn south on the west side of U.S. Highway 41 and proceed south for approximately 481 m (1,580 feet) through the FPL tank farm before turning east again. It would cross the CSX railroad and parallel the FPL Transmission Line ROW across U.S. Highway 41. The pipeline would end at the collocated interconnection with the Gulfstream and TECO pipelines within industrial property owned by Port Dolphin (see **Figure 2.3-3**). From those two interconnection points, natural gas would be transported to serve residential, commercial, and industrial consumers, primarily in the west-central parts of Florida.

LNG delivered to the Port would be obtained from LNG supply at locations including the Caribbean, Africa, and the Middle East. The Applicant reported that it intends to procure LNG from supplies available through LNG supply markets. Construction of the Port components would be expected to take approximately 11 months beginning with offsite fabrication of Project components starting in August 2010, with startup of commercial operations in mid 2011. Construction of the onshore pipeline would



Source of Environmental Constraints: ConShelf 2007.

Figure 2.3-2. Port Dolphin Nearshore Project Location Diagram



Source of Topographic Map: USGS 2001.

Figure 2.3-3. Port Dolphin Onshore View of the Project Location Diagram

commence in summer of 2010 and be completed in approximately 3 months. The Port would be designed, constructed, and operated in accordance with applicable codes and standards and would have an expected operating life of approximately 25 years.

The functions of the Port would be to temporarily moor SRVs, vaporize LNG, meter natural gas, and send out natural gas by pipeline. The major fixed components of the Port would be two unloading buoy systems in a water depth of approximately 30.5 m (100 feet); eight mooring lines consisting of wire rope and chain connecting each unloading buoy to anchor points on the seafloor; eight driven pile anchor points; one flexible pipe riser to each buoy; riser manifolds; one flowline from the north buoy approximately 3.2 km (2 mi) in length; one flowline from the south buoy approximately 3.2 km (2 mi) in length; a single 36-inch offshore natural gas transmission line (approximately 67.6 km [42 mi]) to landfall in Manatee County; and a continuation of the 36-inch natural gas pipeline from its landfall point for 6.4 km (4 mi) to the collocated Gulfstream and TECO Interconnection Station where it would tie into metering facilities, transition manifolds, hot taps, and connecting pipes tying into the existing Gulfstream and TECO pipelines. These components are further described in subsequent subsections.

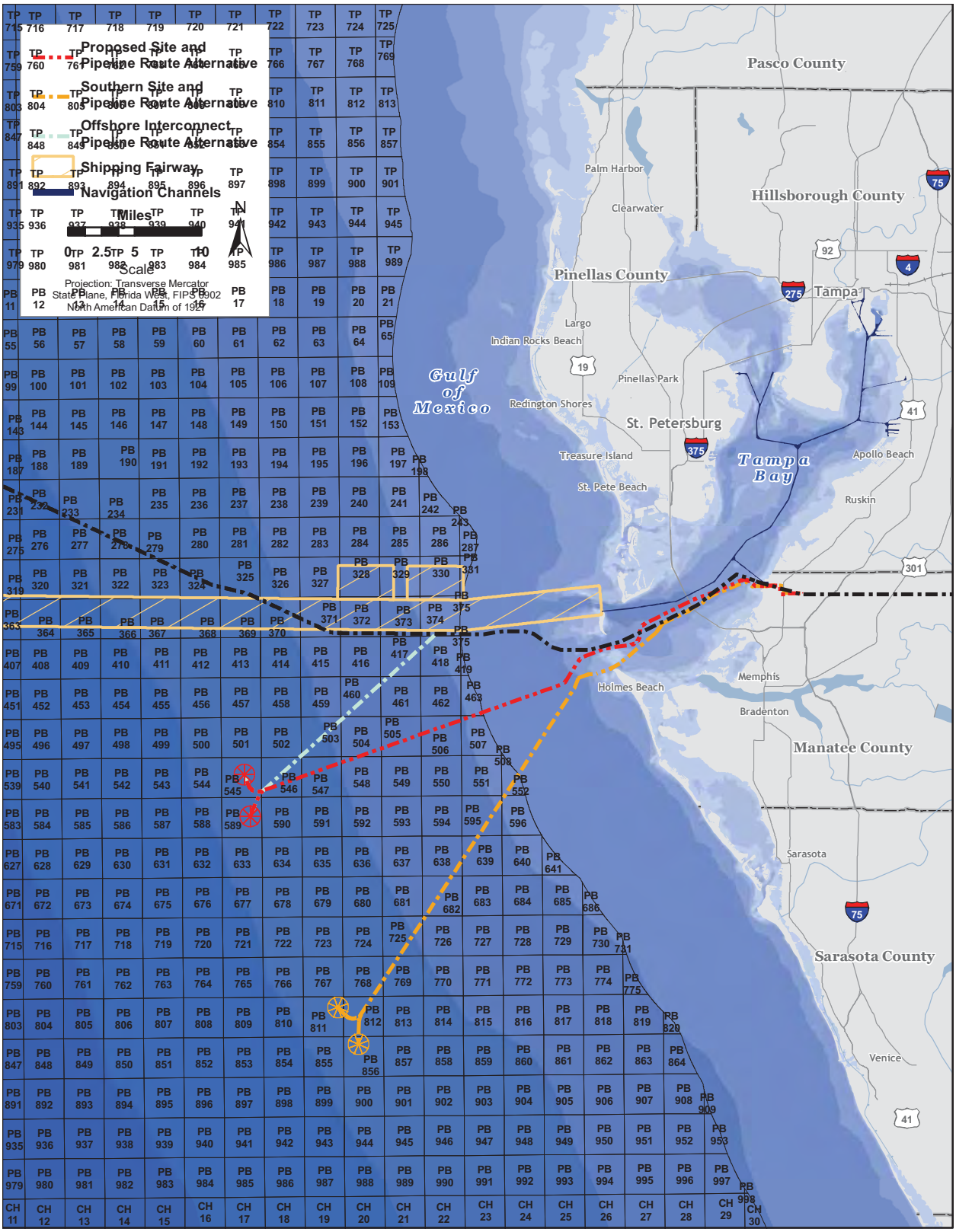
2.3.2 Lease Blocks and Overall Site Plan

The Port unloading buoys would be in MMS PB blocks: PB545 and PB589. The lease blocks where the Port would be are shown in **Figure 2.3-4**. The SRVs would approach the Port from the south and maneuver into position on the buoys depending on variations in weather and other local conditions. The approaches to or exits from the buoys would include MMS PB blocks: PB500, PB501, PB543, PB544, PB587, PB588, and PB631. Other lease blocks might be crossed as the SRVs enter the GOM and transit to the Project area. The natural gas transmission line would originate in block PB546 and pass through blocks PB547, PB548, PB504, PB505, PB506, PB507, and PB463 before it reaches the state/Federal undary. **Table 2.3-1** lists the lease blocks identified as being within the Project area and the SRV access and egress routes. There are no existing leases in any of the blocks identified in **Table 2.3-1**.

Table 2.3-1. Lease Block Information for the Proposed Action

Description	OCS Area	OCS Lease Blocks
North Unloading Buoy	St. Petersburg	545
South Unloading Buoy	St. Petersburg	589
Gas Transmission Line	St. Petersburg	547, 548, 504, 505, 506, 507, and 463
SRV Route	St. Petersburg	500, 501, 543, 544, 587, 588, and 631

Figure 2.3-4 shows the marine site plan for the Port. The site plan includes the proposed size and location of all fixed and floating structures and associated components seaward of the high-water mark. **Figure 2.3-4** also shows navigational fairways approaching Tampa Bay. The Port would have no associated anchorage areas for SRVs or support vessels.



Source of Lease Blocks: MMS 5/31/2007

Figure 2.3-4. Lease Blocks in the Vicinity of the Port Dolphin Project

2.3.3 Shuttle and Regasification Vessels

SRVs with approximate cargo capacities of either 145,000 m^3 or 217,000 m^3 based on standard designs for oceangoing LNGCs would be used to supply LNG to the Project. The vessels would also be equipped with a trunk and mating cone to receive the unloading buoy, lifting and connection devices, an LNG vaporization system, and gas metering systems. The SRVs would have accommodations for as many as 42 persons. Normal crew size would be approximately 30 persons. All critical functions would be manned 24 hours per day; other functions would be accomplished on a regular, scheduled basis. The following provides details on each SRV.

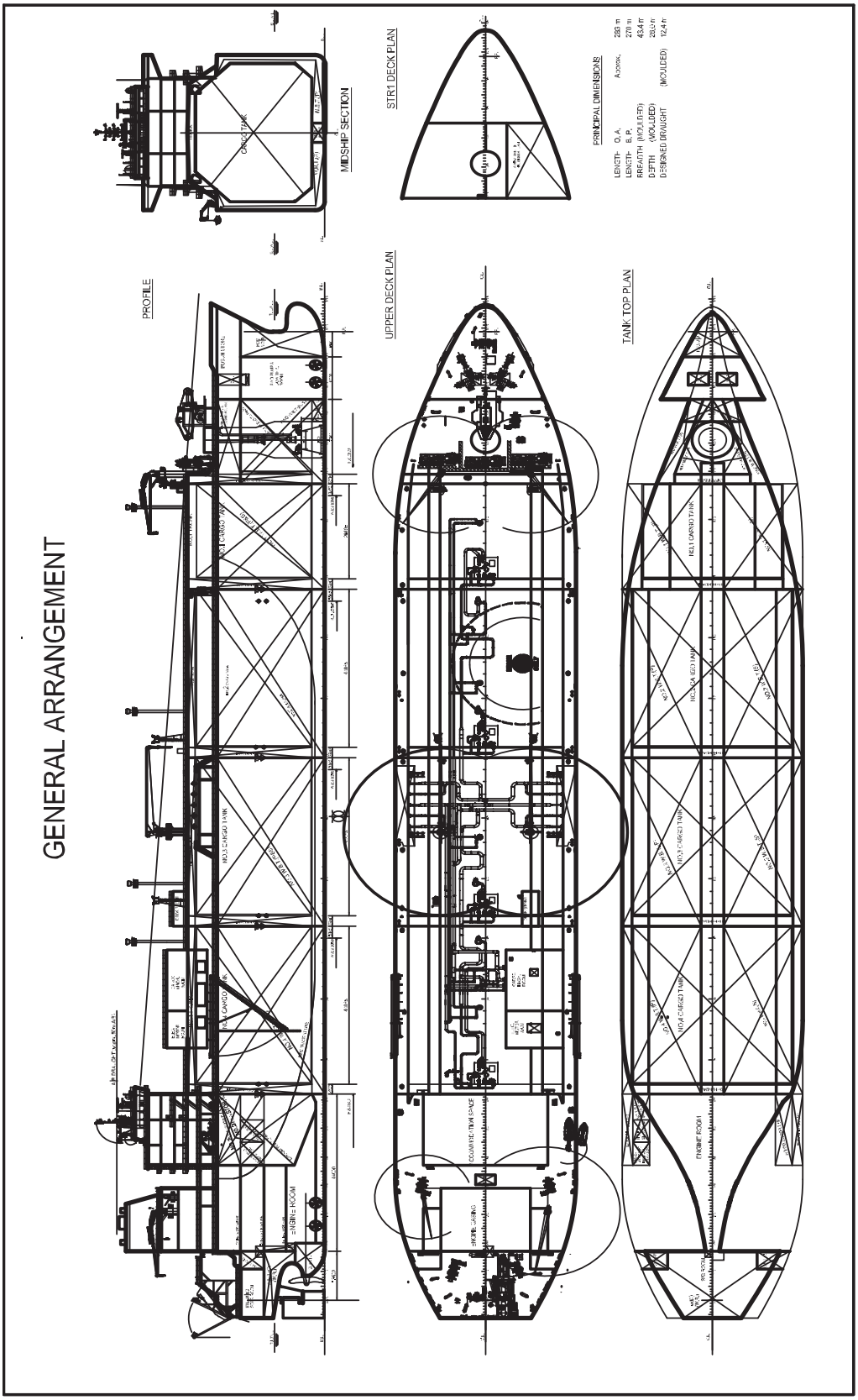
Dimensions. Approximate dimensions of each SRV would range from 280 m (918 feet) in length and 43 m (141 feet) in breadth, with a design draft of 11.4 m (37.4 feet) for the 145,000 m^3 vessels to 315.5 m (1,035 feet) in length and 50 m (164 feet) in breadth, with a design draft of 12 m (39.5 feet) for the 217,000 m^3 vessels. The maximum height above the waterline would be 41.1 m (135 feet). The 145,000 m^3 SRV would displace 80,000 metric tons and the 217,000 m^3 SRV would displace 108,000 metric tons. A drawing of a typical SRV is shown in **Figure 2.3-5**.

Hull. The SRVs would generally have a flush deck without forecastle, a bulbous bow, and a transom stern. The engine room, crew accommodation, and bridge would be located aft. Bow thrusters and stern thrusters would be provided to improve maneuvering of the SRV when approaching the loading or unloading locations but thruster designs would vary between vessels. A trunk and mating cone would be constructed in the forward part of the SRV to allow it to moor to the unloading buoy at the Port. The SRV would have a double hull arrangement. The inner hull would accommodate the membrane-type LNG storage tanks. Moss-type vessels would have spherical tanks to contain the LNG. The double bottoms and double sides would be used for seawater ballast. A conventional cargo manifold amidships would be provided for loading and unloading of the LNG at shoreside facilities.

Capacities. The two vessel types that serve the Port would have a capacity of approximately 145,000 m^3 or approximately 217,000 m^3. The ballast tank capacity would be sufficient to limit the draft variations when loading and discharging the cargo. The SRV and the cargo containment and handling systems would be suitable for cargoes of specific gravities up to 0.50. Various tanks aboard each SRV would have approximately the following ranges of capacities: diesel oil tanks, 6,000 m^3 (1,583,400 gallons [gal]) to 7,000 m^3 (1,848,000 gal); distilled water tanks, 280 m^3 (11,760 gal); freshwater tanks, 250.0 m^3 (66,000 gal) to 600 m^3 (159,600 gal); and potable water tanks, 200 m^3 (52,500 gal). The fuel capacity would be sufficient for a range of approximately 13,000 nautical miles (NM) with 5 days of reserve.

Propulsion and Electrical Power Generation. The 145,000-m^3 SRV's power plant would use four dual-fuel diesel engines, one producing 5.7 megawatts (MW) and three producing 11.4 MW. Two 11.4-MW engines would be equipped with selective catalytic reduction (SCR) and oxidation catalyst and used for electrical power generation when the SRV is moored. One 5.7-MW engine would be equipped with SCR and oxidation catalyst and would be needed for propulsion and electrical power generation when the SRV is underway, positioning, and hotelling at the Port. One 11.4-MW engine would not be equipped with emissions controls and would be used only outside of the safety zone and during ocean transit. Propulsion would be provided by a single-screw driven by twin electric motors.

The dual-fuel diesel engines would burn 99 percent natural gas (a combination of 67 percent boil-off gas from the cargo tanks, 32 percent vaporized LNG), and 1 percent marine diesel as pilot fuel. The dual-fuel electric machinery concept would offer a substantial improvement over traditional steam turbines in terms of operating economy, exhaust gas emissions, and redundancy. At the same time, standards of safety, reliability, and maintainability would be kept at appropriate levels. The increased economy over



Source: Port Dolphin 2007a

Figure 2.3-5. Typical Shuttle and Regasification Vessel with Sea Chest Arrangement

conventional steam plants is a result of the higher efficiency of dual-fuel engines. Instead of a conventional steam plant, the Project's SRVs would use up to four low-pressure marine auxiliary boilers, each rated at about 278 MMBtu per hour (MMBtu/hr). These would be designed to operate on cargo boil-off gas and vaporized LNG. The steam would be supplied to the cargo vaporization units and not to the power generation and propulsion system.

Dynamic Positioning. The SRVs would have two thrusters forward and could have one or two thrusters aft. These thrusters push water out the side of the vessel to allow precise control of position while mooring with the buoy. Each thruster would have a controllable pitch propeller, with joystick control at the bridge house and bridge wings. The dynamic positioning system would be used while retrieving the submerged unloading buoy handling line and moving onto the buoy. The system normally would not be used while the SRV is moored to the unloading buoy. The SRV would be equipped with a thruster control system with a specially developed software program for handling all unloading buoy mooring operations. The SRV would also have a differential global positioning system (DGPS) and an acoustic position reporting system (APRS). The APRS would be used for monitoring the unloading buoy draft and its position before and during connection/disconnection. The bottom of the unloading buoy would be fitted with six transponders, equally spaced around the circumference of the lower part of the buoy. The APRS would automatically search for the strongest return signal from the buoy. If the APRS should lose the return signal from the transponder, the search procedure would start again.

SRV Mooring System. The SRVs would be equipped with normal mooring equipment for conventional LNGCs including port and starboard anchors. Head, breasting, and spring lines would be provided for mooring to shoreside LNG pier facilities. In addition, the SRVs that would be used at the Port would be equipped to moor to the unloading buoys.

LNG Containment System. The proposed cargo system for the 145,000 m^3 vessels would have either membrane or spherical-type tanks. The LNG with a specific gravity of typically between 0.43 and 0.47 would be stored at -160 °C (-256 °F). The maximum daily boil-off rate would be 0.15 percent of the cargo capacity. Spherical or prismatic cargo systems could be proposed for other vessel classes. The final design chosen by the Applicant would comply with all International Maritime Organization (IMO) requirements applicable to vessels designed for a 40-year North Atlantic operational lifespan.

2.3.4 Vaporization and Process Facilities

Regasification System. Each SRV would be equipped with up to five vaporization units, each with the capacity to vaporize 250 MMscfd (about 210 metric tons per hour [MT/hr]). Under normal operation, two or more units would be in service, with one unit on standby. The average annual send-out capacity would be expected to be 800 MMscfd. SRVs would be designed for simultaneous operation of all units at a maximum send-out capacity of 1,200 MMscfd.

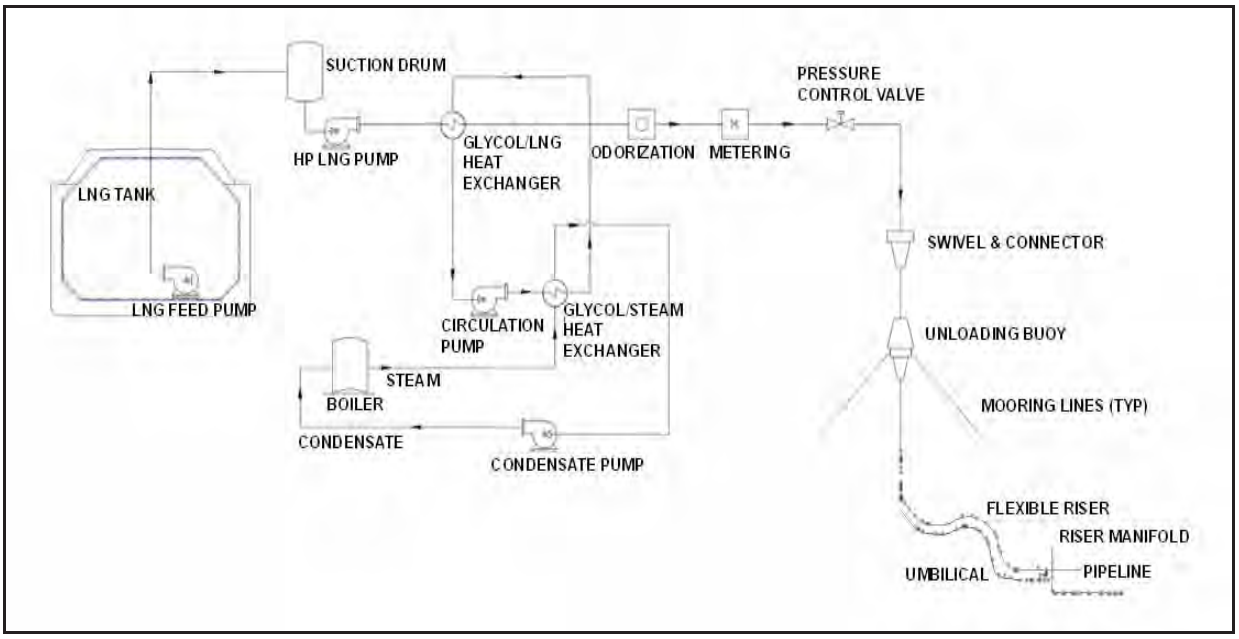
The vaporization system would be installed on the main deck in the front of the vessel. Each unit would be independent and could be disconnected from the main deck for transportation to shore for maintenance. Each unit would include the following components: two high-pressure cryogenic LNG pumps, two heating glycol/water-brine circulation pump, one steam/brine heat exchanger, one brine/LNG heat exchanger, and one control module. LNG at -160 °C (-256 °F) and approximately 72 pounds per square inch (psi) would be pressurized in multistage centrifugal pumps to a pressure up to 1,740 psi. The LNG would then be evaporated and heated as gas ranging in temperature between 0 to 10 °C (32 to 50 °F). Heating would be accomplished in a shell-and-tube heat exchanger, where LNG would be evaporated and heated in the tubes, and a glycol/water-brine solution would flow through the shell and around the tubes that contain the LNG, heating the LNG in tubes.

The intermediate fluid (glycol/water-brine) used to heat the LNG would be warmed by steam generated in the auxiliary boiler. This avoids the use of steam from the SRV's boiler room directly in a heat exchanger against LNG. This would prevent the danger of hydrocarbon gas entering the boiler room if internal leakage in the LNG/steam heat exchanger were to occur.

The glycol/water-brine would be circulated in a closed loop. Glycol/water-brine, being pumped with sufficient head to drive it through the closed loop, would enter the LNG heat exchanger at 90 °C (194 °F) and leave at 20 °C (68 °F). The glycol/water-brine would then be reheated in the steam, at which time it would again enter the LNG heat exchanger.

Steam would be piped from the engine room to the steam-to-glycol/water-brine heat exchanger. Condensed steam from the heat exchanger would be returned to the boiler feed water tanks at about 100 °C (212 °F). Steam supply would be adjusted by a control valve regulated by the temperature of the vaporized LNG.

In addition to the LNG vaporization units, a forcing vaporizer would be installed in the cargo compressor room to vaporize LNG, supplied by one of the spray pumps in the cargo tanks, for supplying fuel gas to the dual fuel engines. The capacity of the forcing vaporizer would be sufficient to produce the full quantity of fuel gas as forced boil-off to achieve 100 percent gas demand from the two dual fuel engines at maximum generated output. The STV closed-loop LNG vaporizer process flow diagram is presented in **Figure 2.3-6**.



Source: Port Dolphin 2007a

Figure 2.3-6. STV Closed-Loop LNG Vaporizer Process Flow Diagram

Cooling and Ballast Seawater. Seawater would be used to ballast the SRV, cool the dual-fuel diesel engines supplying power for the regasification process, and condense the steam produced by the boilers supplying heat to the vaporization process. Ballasting the SRV is required to maintain proper buoyancy as the LNG is vaporized and offloaded through the pipeline. Water intake for ballasting the SRV would require an average intake of 360 m^3 per hour (2.3 MGD) over the vaporization cycle. The seawater cooling system would take in seawater through one of two sea chests, each measuring 1.5 m by 2.0 m (4.9 feet by 6.56 feet). The seawater intakes for the cooling system are located in the aft near the engine

rooms at depths of 4.6 and 7.6 m (15 and 25 feet). The cooling water system would require an intake of approximately 1,520 m^3 per hour (9.5 MGD). Water velocity through the lattice screens at the hull side shell would not exceed 0.15 m/s (0.5 ft/s) at the maximum flow rate of 1,520 m^3 per hour (6,692 gallons per minute [gpm]).

Cooling water discharges would be made at points removed from the intake sea chests to avoid recirculating warmed water through the cooling system. All of the cooling water would be discharged at a temperature of approximately 10 °C (18 °F) above the ambient water temperature. Although the seawater system would be equipped with a chlorination system to prevent biofouling of heat transfer surfaces and system components, the chlorination system would not be used while the SRVs are approaching the Port or moored at the buoys. Discharges of ballast water would be made when the SRV takes on its next cargo of LNG, and international and the local country's requirements for discharging ballast water would apply.

Produced Discharges. The SRVs would have three production discharges while at the buoy: stack gases from the auxiliary boilers and the dual-fuel engines, warmed water discharges from cooling water system, and discharges of storm water from exposed deck areas.

Emissions would be produced by the gas-fired marine auxiliary boilers, each rated at about 278 MMBtu/hr, and from the dual-fuel engines. The proposed boilers would have SCR units to reduce NO_x emissions to 0.037 pounds (lb)/MMBtu and combustion controls would limit carbon monoxide (CO) to 0.015 lb/MMBtu.

Two of the 11.4-MW dual-fuel engines and one 5.7-MW dual-fuel engine would have SCR units to reduce NO_x emissions. The SCR system would use ammonia as the catalyst agent to reduce NO_x formation. An oxidation catalyst would also be installed on the dual-fuel engines to reduce CO and VOC emissions. Two 11.4-MW dual-fuel engines would not be provided with SCR as these engines would be used only for propulsion.

Boil-off gas would be fully consumed by the dual-fuel engines and boilers. In the event of insufficient boil-off gas to fuel the engines and boilers at peak load, additional LNG would be vaporized and used. If excess boil-off gas were present, a vapor combustor would be used to burn the excess gas; the vapor combustor would only be operated when LNG vaporization equipment is shut down.

2.3.5 Operations

The following describes major aspects of Port operations.

Operations Manual. Based on available preliminary information, the Applicant has prepared a draft Operations Manual for the Port. As design and construction of the Port proceeds, the manual would be updated and resubmitted to the USCG for final approval prior to commencement of any operations.

Loading and Transit. LNG would be transferred from a foreign shoreside LNG pier to the SRVs. The loading operations would typically require approximately 1 day for berthing the SRV, loading the LNG, and preparing for departure from the LNG pier at the supply location. Normal security and safety policies would be followed and would comply with all applicable international rules and regulations. While in the open ocean, the SRVs would typically transport the LNG at speeds up to 19.5 knots and comply with the International Convention for the Prevention of Pollution from Ships (MARPOL), the Society of International Gas Tanker and Terminal Operators (SIGTTO), and other applicable international rules.

Connecting, Vaporization, and Unloading. When an SRV is not moored to the unloading buoy, the buoy would be submerged approximately 18.3 to 21.3 m (60 to 70 feet) below the ocean surface, and held in place on the Landing Pad by the mooring lines. The riser would remain attached. The valves at the top of the buoy and at the pipeline end manifold (PLEM) would be closed. A buoy marker and retrieval line would go from the top of the unloading buoy to a marker buoy that would be equipped with the required navigation lights. When the SRV approaches, the SRV would retrieve the unloading buoy with specific shipboard equipment, connect the buoy to the mating cone in the hull of the SRV, and prepare for vaporization and unloading of the LNG. Two unloading buoys approximately 5 km (3.1 mi) apart would be used so that natural gas could be delivered in a continuous flow without interruption by having brief overlap between arriving and departing SRVs. One SRV would typically be at the Port at all times. The SRV would typically be connected to the buoy for 4 to 8 days while vaporizing the LNG, depending on the cargo capacity and send-out rate of the SRV. As the first SRV moored at the Port is emptied, a second SRV would arrive and moor at the Port. One vessel would be moored to each of the two buoys to allow for continuous send-out of natural gas. As the first vessel completes vaporization of its cargo and the second vessel has initiated vaporization, the first vessel would shut down its vaporization equipment, disconnect from the buoy, and depart the Port area. It is estimated that between 45 and 90 SRVs would use the Port annually (Port Dolphin 2008a).

Disconnection from Unloading Buoy. Prior to departure of the SRV, the unloading buoy would be disconnected and lowered to rest on the Landing Pad approximately 18.3 to 21.3 m (60 to 70 feet) below the ocean surface.

Manning and Crew Changes. The SRVs would have accommodations for as many as 42 crew members, but the typical crew size would be approximately 30. All critical functions would be manned 24 hours per day. Other functions would be accomplished on a regular, scheduled basis. Crew changes could take place at either the LNG loading site or at the Port. Crew changes at the Port would be made using the dedicated Crew Vessel.

Pipeline Operation. The SRVs would control the normal send-out of revaporized natural gas into the pipeline system with onboard control and monitoring systems, unloading buoy valves, and remotely operable valves in the PLEM. A control umbilical containing electrical and hydraulic control circuits would allow remote control of buoy manifold and PLEM valves. The isolation valve at the PLEM would also have an overpressure sensor that would automatically actuate the shutoff valve if pipeline overpressure was sensed. Intervention and maintenance work might require divers or a remotely operated vehicle to open or close pipeline system valves. The pipeline system would be designed to accommodate subsea pigging operations (a pig is a device that moves through the inside of a pipeline for the purpose of cleaning, dimensioning, or inspecting the interior of the pipe), including passage of instrumented internal inspection devices, for the flowlines and the gas transmission pipeline. In addition, flanged connections and tie-in spools could be leak-tested underwater without having to pressure-test the entire system. A block valve would be located on Port Manatee property to allow Project operations personnel in the onshore support facility to isolate the pipeline. Additional isolation valves; pig receivers; and filtration, liquid removal, and measurement devices would be at the collocated Gulfstream and TECO Interconnection Facility.

2.3.6 Mooring and Unloading Buoys

The design of the mooring and unloading buoys would be based on proven technology used for more than a decade in hostile ocean environments such as the North Sea, as well as for the Excelerate Gulf Gateway Project. The technology is also proposed for the Neptune Project and used in the Northeast Gateway Project. It was proposed for the Calypso Project, which has since been withdrawn by the Applicant. The

unloading buoy would have the same dimensions as other ports to provide the greatest flexibility for the quantity of vessels that could moor to the unloading buoy.

The size and length of the mooring lines, risers, and control umbilicals would be custom-designed for the site-specific conditions for the Port facility during the detailed design and construction phase of the Project. The mooring and unloading buoys would be designed for the SRV to remain moored on location during non-hurricane 100-year storm conditions, and to survive the 100-year storm conditions when the unloading buoy is submerged below the ocean surface.

Unloading Buoys. The Port would include two unloading buoy systems in a water depth of approximately 30.5 m (100 feet) and separated by a distance of approximately 5 km (3.1 mi). Each unloading buoy would have eight mooring lines consisting of wire rope and chain connecting each unloading buoy to anchor points on the seafloor, eight anchor points consisting of driven piles, one 16-inch inside diameter (ID) flexible pipe riser, and one electrohydraulic control umbilical from the unloading buoy to the riser manifold (see **Figure 2.3-7**).

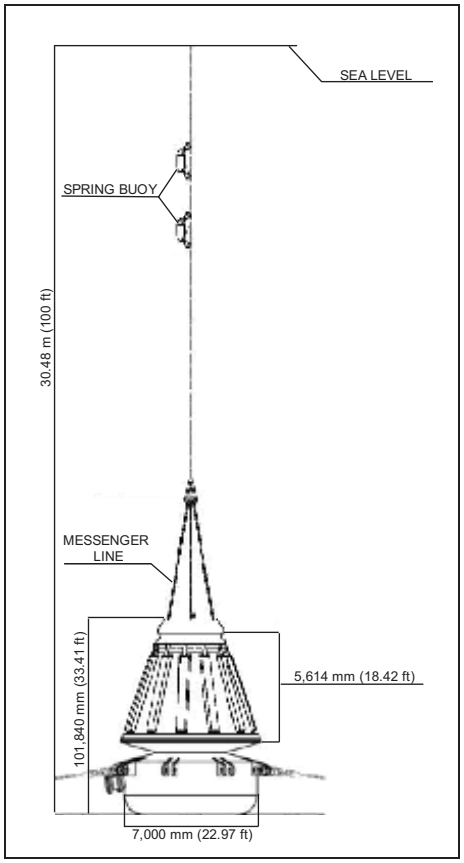


Figure 2.3-7. Schematic of a Submerged Turret Loading Buoy

Buoyancy Cone. The buoyancy cone would be a welded, conical steel structure that would provide required buoyancy and ensure smooth transfer of mooring, riser/umbilical, and reaction forces to the vessel hull. The buoyancy cone would be locked into the mating cone in the SRV when the unloading buoy is connected. The outer shell would be designed to withstand expected impact loads during hook-up and disconnection, in addition to hydrostatic pressure in the submerged position. Physical contact with the vessel would be limited to the upper and lower mating rings, which require strict, interface tolerances. A vertical support structure would be located on top of the buoyancy cone. The top would also serve as a protective structure for the buoy-mounted valves and the male part of the mechanical connector so they would not suffer damage during connection and disconnection. Lifting and pull-in pad-eyes also would be integrated in the top of the structure.

Turret. The integrated turret would be the fixed portion of the unloading buoy. It would consist of a shaft and a lower section with mooring connections (pad-eyes). Mooring line tensions would be transferred into the turret through the turret pad-eyes. These forces would be further transferred via the bearings and into the buoy and vessel structure. The turret would be buoyant. To contribute to the overall buoyancy requirements, as well as to reduce thrust forces on the axial bearing during operation, it would be divided into separate watertight compartments. The turret would be equipped with integrated guide-tubes allowing the riser and umbilical to be pulled all the way through the turret for final suspension at the turret top plate.

Mooring Connection. Each mooring line would be connected to the lower turret section at a double lug integrated with the turret internal structure. A connecting link element would be fitted between the lugs and the mooring wire socket to allow free pivoting about both axes.

Turret Bearings. The main purpose of the turret bearings would be to ensure load transfer from the turret structure to the buoyancy cone and allow free and unrestricted rotation. There would be three main bearings in the buoy: upper axial bearing, upper radial bearing, and lower radial bearing. The upper axial bearing would support all the vertical loads from the mooring, riser/umbilical, and valve/connector/swivel assembly. This bearing would be exposed to the highest continuous loading. The turret bearings would be designed to allow full weathervaning of the vessel with no restrictions regarding weather conditions or vessel operation. All turret bearings would be made in segments of self-lubricating, sliding, and bearing materials. The upper bearing segments (both axial and radial) would be fitted into a housing in the locking recess ring of the buoyancy cone. The lower bearing segments would be fitted into a housing in the lower ring of the buoyancy cone. The bearings could operate properly even when submerged in nearly stagnant seawater. The turret bearings would be designed to operate without additional lubrication.

Pick-up Line System. To pull in the unloading buoy for mating to the SRVs, a pick-up assembly would be connected to the top of the unloading buoy. The main components would be a three-leg lifting bridle, a messenger line with spring buoys for attachment to the messenger line to obtain extra buoyancy, and a marker buoy and a finger buoy to facilitate location and pick up by the arriving SRV.

Landing Pad. A concrete or steel landing pad would be fixed to the seafloor by means of a skirted mud mat to allow lowering the turret to the ocean floor when it is not in use. The landing pad would have fenders to reduce impact loads.

Anchors. Each unloading buoy would be connected to eight driven piles. Each pile would be 1.8 m (6 feet) in diameter and approximately 20 to 30 m (66 to 98 feet) long. The anchor coordinates for the northern and southern unloading buoys are shown in **Table 2.3-2**.

Table 2.3-2. Mooring Anchor Locations and Line Length

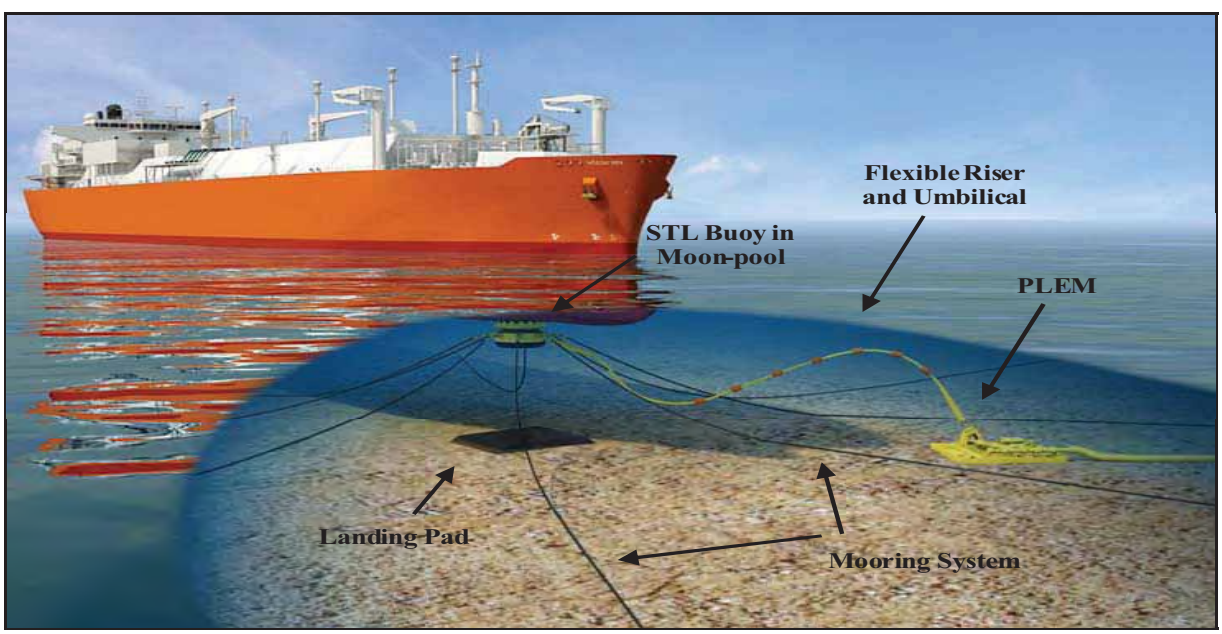
Anchor	Coordinates (NAD 27)		Distance from Turret Center to Mooring Anchor (m)
Northern 1	27°25’38.70	83°11’50.40	800
Northern 2	27°25’27.17	83°11’33.58	650
Northern 3	27°25’12.32	83°11’26.50	650
Northern 4	27°24’57.36	83°11’33.26	650
Northern 5	27°24’54.16	83°11’49.84	800
Northern 6	27°24’50.11	83°11’14.31	950
Northern 7	27°25’11.82	83°11’24.66	950
Northern 8	27°25’33.71	83°11’14.78	950
Southern 1	27°22’54.66	83°11’22.78	800
Southern 2	27°22’43.76	83°11’5.96	650
Southern 3	27°22’28.91	83°11’58.88	650
Southern 4	27°22’13.94	83°11’5.64	650
Southern 5	27°22’02.75	83°11’22.22	800
Southern 6	27°22’06.74	83°11’46.68	950
Southern 7	27°22’08.42	83°11’57.03	950
Southern 8	27°22’50.30	83°11’47.15	950

Source: Port Dolphin 2007g

Mooring Lines. Each unloading buoy would have eight mooring lines designed so that the SRV could remain moored in the non-hurricane 100-year storm conditions. Mooring lines would vary in length, from 548.6 to 1,219.2 m (1,800 to 4,000 feet) for the northern unloading buoy and from 762 to 1,097.3 m (2,500 to 3,600 feet) for the southern buoy. The mooring lines would consist of 132-millimeter (mm) (5.25-inch) Grade R4 chain and 120-mm (5-inch) spiral-strand wire rope. Information on the mooring lines is provided in **Table 2.3-2**.

Flexible Riser. The riser system for each unloading buoy would consist of one 40-centimeter (cm) (16-inch) interior diameter flexible riser in a steep-wave configuration (see **Figure 2.3-8**). The riser would be directed between two of the mooring lines. Total length of the riser is approximately 82 m (269 feet). The horizontal distance from the turret centerline to the PLEM is approximately 75 m (246 feet). The flexible riser system would lie on the seafloor when not in use. A typical flexible riser has various layers consisting of the following, starting with the innermost layer:

- Carcass. Essentially a corrugated metallic tube that forms the body of the flexible pipe. The primary function is to prevent the polymer inner liner from collapsing due to possible external pressure or rapid decompression.
- Pressure sheath. An inner liner that is highly resistant to hydrolysis and virtually any chemicals used in the offshore industry.
- Pressure armor. Consists of C- or Z-shaped profiles.
- Tensile armor. Consists of two cross-wound layers of rectangular carbon steel wires providing the strength of the flexible riser with respect to axial forces that are induced by the internal working pressure, weight of the flexible pipe, and external loads (e.g., tension loads during installation or dynamic loads).
- Insulation layer. Applied before the extrusion of the outer sheath.
- Outer sheath. Protects the steel armor layers against mechanical damage and exposure to seawater, thus providing corrosion protection of the steel strands in both the pressure and the tensile armor.



Source: Port Dolphin 2007a

Figure 2.3-8. Flexible Riser System Configuration

End terminations and termination flanges would be at each end; end terminations would provide a gas relief system. In addition, the upper end would be fitted with a bend stiffener that would be pulled into the lower part of the guide-tube in the unloading buoy.

Control Umbilicals. The control umbilical would connect the PLEM controls to the control system onboard the SRV. The umbilical would have sufficient hydraulic lines to open and close valves and sufficient signal lines to transmit required information. The upper end of the umbilical would be fitted with a bend stiffener that would be pulled into the lower part of the I-tube in the unloading buoy. The umbilical would be further fitted with an end termination and hang-off arrangement at the upper turret plate. The hydraulic and signal lines would be routed from the end termination to wet mateable connectors. At the manifold end, the umbilical would be fitted with an end termination that, most likely, would be bolted to the manifold. The hydraulic and signal lines would necessarily have wet mateable connectors. The umbilical would be fitted with distributed buoyancy and configured the same way as the flexible riser (either as stand-alone or strapped to the flexible riser). The control umbilicals would rest on the seafloor when not in use.

Design Criteria for the Mooring and Unloading Buoys. The maximum sea state for connection of the SRV to the unloading buoy would be a significant wave height of 3.5 m (11.5 feet), 1-hour mean wind speed of 15 m/s (29 knots), and current speed of 1.5 m/s (3.0 knots). The maximum sea state while connected to the unloading buoy would be the 100-year extra-tropical storm condition (non-hurricane) with a significant wave height of 6.2 m (20.3 feet), 1-hour mean wind speed of 20 m/s (38.9 knots), and current speed of 1.5 m/s (3 knots). The maximum sea state for disconnection of the SRV from the unloading buoy would be a significant wave height of 6.2 m (20.3 feet), 1-hour mean wind speed of 20 m/s (38.9 knots), and current speed of 1.5 m/s (3 knots), which is defined as a 100-year extra-tropical storm condition.

2.3.7 PLEM

Integral to the Project pipeline system would be two PLEMs near the unloading buoys that would connect the flexible risers to the flowlines and a Y-connection that would connect the two flowlines to the new gas transmission pipeline. There would be two PLEMs in the system, each approximately 75 m (246 feet) offset from the proposed unloading buoy locations. The purpose of the PLEM would be to provide an interface between the pipeline system and the flexible riser, isolate the riser between gas unloading operations, and attach a subsea pig launcher or receiver. Each PLEM would include a flange connection for attaching the flexible riser or the subsea pig launcher/receiver and a full-bore subsea hydraulic control valve and electrohydraulic umbilical termination assembly. Each PLEM would have a mud mat foundation to provide a stable base for bearing PLEM and riser weight and to resist sliding and overturning forces.

2.3.8 Offshore Pipelines

The Project pipelines would consist of two 36-inch flowlines approximately 3.2 km (2 mi) long from the southern PLEM and 3.2 km (2 mi) long from the northern PLEM to a Y-connection. From the Y-connection a 36-inch gas transmission line approximately 74.0 km (46 mi) long would carry the gas from the unloading buoys to interconnections with the Gulfstream and TECO pipeline systems. The pipelines would have a nominal outer diameter of 36 inches, nominal wall thickness of 1.9 cm (0.75 inches), an external coating of fusion-bonded epoxy coating with a thickness of 0.04 cm (0.016 inches), and a concrete weight coating thickness of 11.4 cm (4.5 inches). The location and routing of the pipelines is shown in **Figures 2.3-1** and **2.3-2** and the basic pipeline design criteria are shown in **Table 2.3-3**.

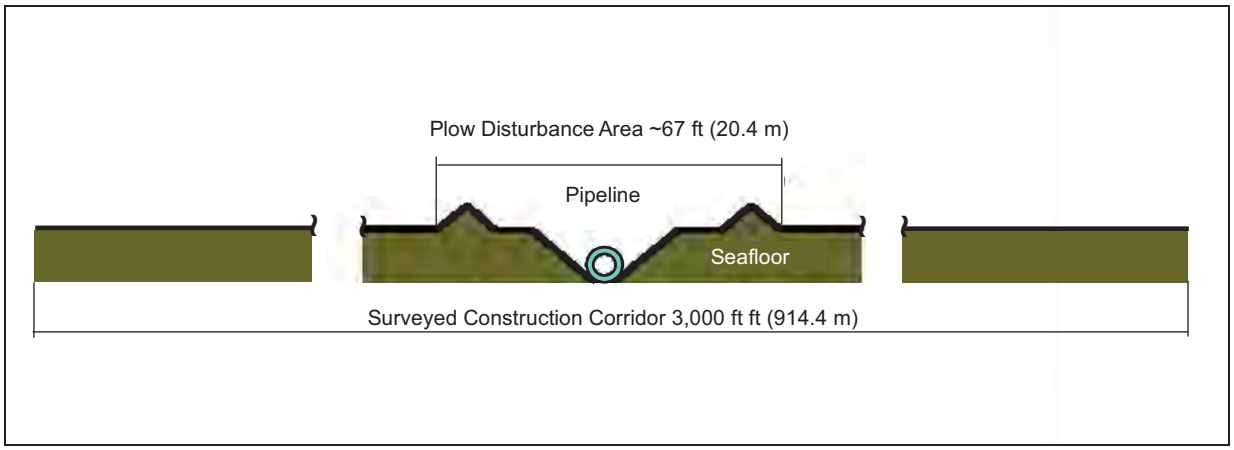
Table 2.3-3. Pipeline Basic Design Criteria

Criteria	Value
Water depth range	0 feet to 110 feet
Maximum allowable operating pressure	1,750 psig
Normal operating pressure	1,000 psig
Throughput range	4 MMscfd – 1.2 Bscfd
Pipe fabrication method	Submerged arc welded
Steel unit weight	490 lbs per cubic foot
Concrete weight coating density	190 lbs per cubic foot
Design life	25 years

Note: psig – pounds per square inch gauge

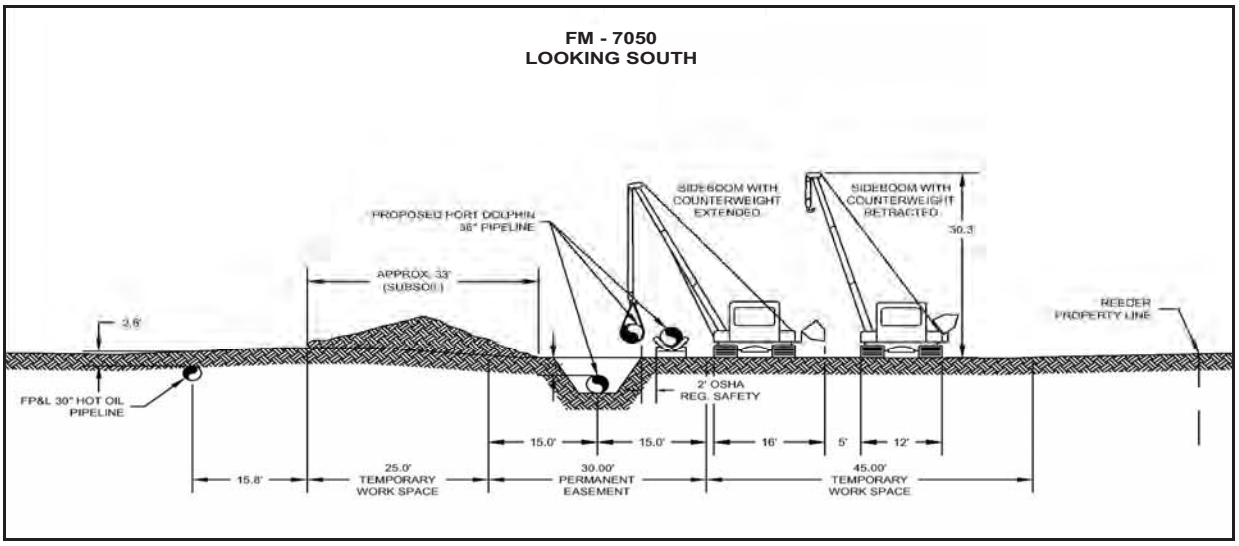
Pipeline trenching and burial requirements are governed by 30 CFR 250 Subpart J, which requires pipelines and all related appurtenances to be protected by 0.9 m (3 feet) of cover in all portions in water depths less than 61 m (200 feet). The flowlines and pipeline would be buried to a depth of 0.9 m (3 feet) in both Federal and state waters. Portions of the pipelines through hard-bottom areas might not be buried to the full 0.9 m (3 feet) depth. In these areas flexible concrete mattresses would be used to cover the pipeline. In places that the pipeline crosses shipping lanes, it would be buried 3.0 m (10 feet) if the seafloor permits plowing. Burying the pipeline and flowlines would protect them from potential damage from anchors and trawls and avoid potential fouling, loss, or damage of fishermen's trawls. The pipeline construction corridor would be 914.4 m (3,000 feet) wide in offshore areas and 30.5 m (100 feet) wide in onshore construction areas. The permanent ROW for the pipeline would be 61 m (200 feet) wide offshore and 9.1 m (30 feet) wide onshore**.** **Figures 2.3-9** and **2.3-10** show the typical construction corridors and permanent ROWs for offshore and onshore construction respectively.

Pipeline Crossings. The proposed pipeline would cross the existing Gulfstream Pipeline two times offshore using HDD drilling technology in order to avoid construction in the Terra Ceia Aquatic Preserve (see **Figure 2.1-14**). The easternmost HDD crossing would be 898 m (2,947 feet) in length, and the westernmost HDD crossing would be 407 m (1,335 feet) in length. Both crossings would be in a water depth of 21 feet. The Port Dolphin pipeline would be drilled to a depth of approximately 6 m (20 feet) below the existing Gulfstream Pipeline (Port Dolphin 2007b).



Source: Port Dolphin 2007a

Figure 2.3-9. Typical Offshore Construction Corridor



Source: Port Dolphin 2007a

Figure 2.3-10. Typical Onshore Construction Corridor

Tie-Ins. There are 11 locations where tie-in operations would be required to piece the pipeline sections together. This mechanical operation is accomplished with specially designed connectors and a manned diving rig. This common operation does not require welding. Tie-ins would be required at each end of all HDD crossings, the Y-connections, and the PLEMs.

2.3.9 Onshore Pipeline and Aboveground Facilities

FERC would have jurisdiction of all Project components from the pier bulkhead to the pipeline's interconnections with Gulfstream and TECO in the western portion of Manatee County, Florida. The onshore portion of the 36-inch gas transmission line would be approximately 6.4 km (4 mi) long. Onshore components would also include a valve station and one interconnection station.

The onshore pipeline would be engineered, designed, constructed, inspected, tested, operated, and maintained in accordance with applicable Federal regulations and guidelines including the U.S. Department of Transportation (USDOT) regulations 49 CFR Part 192, Transportation of Natural Gas and Other Gas by Pipeline: Minimum Federal Safety Standards; and FERC Regulations 18 CFR 380.15, Siting and Maintenance requirements. The Applicant states that it would adhere to the FERC *Upland Erosion Control, Revegetation, and Maintenance Plan* (FERC Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (FERC Procedures) while constructing its onshore pipeline[2]. The Applicant also states that prior to the start of construction it would develop a project-specific "Wetland and Waterbody Construction and Mitigation Procedures" document. The Applicant further states that it would develop a site-specific restoration plan in consultation with appropriate agencies. FERC staff will review these plans once they are filed by Port Dolphin. Port Dolphin would not be authorized to begin construction of the onshore pipeline until these plans (and any other forthcoming information) have been reviewed and approved by the Director of Office of Energy Projects (OEP).

[2] The FERC's Plan and Procedures are a set of construction and mitigation measures that were developed in collaboration with other Federal and state agencies and the natural gas pipeline industry to minimize the potential environmental impacts of the construction of pipeline projects in general.
The Plan can be viewed on the FERC Internet Web site at http://www.ferc.gov/industries/gas/enviro/uplndctl.pdf and the Procedures at http://www.ferc.gov/industries/gas/enviro/wetland.pdf.

Onshore Transportation, Communication, and Utility Crossings. There are six planned transportation, communication, or utility crossings for the onshore portion of the pipeline. An HDD would be used to cross the FPL tank farm at a depth of 12.5 m (40 feet). The proposed pipeline would cross under roadways and the CSX railroad using boring techniques. All bores are expected to be between 4.6 to 6.1 m (15 to 20 feet) below land surface. The HDD would require entry and exit pits resulting in 2.5 acres of extra workspace outside the planned 30.5-m (100-foot) construction ROW.

In comments on the Draft EIS, Gulfstream pipeline objected to the location of the HDD entry point proposed by Port Dolphin. Gulfstream stated that the entry point was too close to its existing pipeline for safe execution of the HDD. Contrary to Gulfstream's allegations, the FERC is not convinced that Port Dolphin's proposed HDD entry point poses an unacceptable safety risk. First, the HDD operators will have an extremely high level of control over the location and path of the drilling operation during the initial entry of the HDD where the proposed pipeline is in proximity to Gulfstream. As an HDD progresses further and further from the entry rig, there is the possibility for some amount of wayward movement; however, this should not pose a problem at the initiation of the HDD where the operators have greater control over the directional path of the drill and more precise information about the location of adjacent utilities. The further the HDD progresses along its alignment path adjacent to Gulfstream, the vertical separation between these two pipelines will increase, as noted below. Second, the location of the Gulfstream pipeline is firmly established, so there is no chance that the HDD would encounter heretofore unknown Gulfstream facilities. Third, according to information submitted by Port Dolphin, the HDD entry point itself is 27 feet from the Gulfstream pipeline, and the HDD entry pit would be at least 20 feet from the Gulfstream facilities. This is within accepted industry practice. Port Dolphin has proposed several measures in order to provide an added level of safety and to address some of Gulfstream's proximity concerns. Specifically, Port Dolphin would:

- Invite Gulfstream personnel to be onsite both prior to construction (to help identify the exact location of the Gulfstream facilities), and during HDD operation
- Fence off Gulfstream's exclusive easement (5 feet on either side of Gulfstream's pipeline), thus preventing any Port Dolphin activity from encroaching within this area
- Shore up the HDD entry pit with sheet piling or other materials to prevent soil collapse near the Gulfstream pipeline.

Gulfstream also expressed concerns over the angle and clearance of the HDD path as it crosses beneath the existing Gulfstream pipeline. However, according to information filed by Port Dolphin, the HDD path (which is a progressively deepening parabola for the onshore portion) would cross below the Gulfstream pipeline with about 75 feet of vertical separation.

Based on its review, the FERC concluded that the HDD proposed by Port Dolphin, along with Port Dolphin's proposed additional safety measures, would be consistent with accepted industry practices. As such, the FERC found Port Dolphin's proposed HDD acceptable. Therefore, no alternative HDD entry points were carried forward for detailed analysis of impacts.

Onshore Wetland and Waterbody Crossings. The pipeline would cross nine wetlands with a total crossing length of 2,596 meters (8,516 feet). The additional protection procedures for wetland crossings include the use of either low-ground-weight construction equipment or the use of timber riprap, prefabricated equipment mats, or terra mats for standard excavation equipment; installing erosion-control devices to minimize sediment flow into the wetland; reestablishing appropriate vegetation species through natural recruitment and planting as necessary; and monitoring the success of the revegetation and weed-control efforts.

Aboveground Facilities. The valve station that would be on Port Manatee property would be approximately 50 feet by 60 feet, and occupy approximately 0.07 acres.

The 36-inch pipeline segment would terminate at the Gulfstream/TECO interconnection station where the pressure and flow of the natural gas would be monitored and controlled. The Gulfstream/TECO interconnection station would occupy an approximate 3.4-acre site on agricultural land purchased by the Applicant. The parcel would be 120 feet by 1,319 feet. At the Gulfstream/TECO Interconnection Station, hot taps would connect the gas transmission pipeline to the existing Gulfstream and TECO natural gas pipeline systems. Equipment and associated piping at the station would control flow, filtration, liquid handling, custody management, and overpressure equipment. The station would be designed to deliver approximately 70 percent of the flow from Port Dolphin to the Gulfstream pipeline, and 30 percent to the TECO pipeline.

No new compressor stations would be constructed. No underground storage of natural gas is proposed as part of this pipeline.

2.3.10 Maritime, Safety, and Related Matters

The following identify several maritime, safety, and related matters pertaining to the Port.

Marine Pipeline Metering System. The SRV's onboard control and safety systems would control pipeline pressures and flow rates at the discharge of the high-pressure LNG pumps. The Port's natural gas product would be metered for commercial purposes onboard the SRV. The metering system would be proposed on the forward part of the main deck between the vaporization units and the unloading buoy trunk. An ultrasonic gas metering system would consist of two ultrasonic gas flow meters, two pressure transmitters, and two temperature transmitters. A gas analyzer system would consist of a sample probe, two gas chromatographs, a pressure reduction cabinet, and an analyzer cabinet. The metering control system would consist of a metering cabinet, two flow computers, terminal flow computers and gas chromatographs, a supervisory computer and operator station, and a local area network switch.

Cargo System. The cargo system would include the necessary pumps and control systems for monitoring and control of the LNG storage tanks. The onboard class-approved load and stability calculator would ensure that liquids are properly distributed to minimize the stresses in the vessel hull. The operator would be able to monitor the cargo fluid levels, temperatures, and processes within each tank and control the valves for filling, emptying, and stripping the tanks. The operator could also monitor and control the auxiliary equipment associated with the cargo system, including the following:

- Compressors. One low-duty gas compressor would be used to provide boil-off gas for the boilers. Also, high-duty gas compressors would be used to return LNG vapor ashore during loading operations, return gas/vapor ashore during gassing-up and initial cool-down operations, and circulate heated cargo vapor through the cargo tank system during warm-up operations.
- Cargo discharge pumps. Each LNG tank would be outfitted with two cargo discharge pumps. These pumps would be single-stage, centrifugal pumps with one inducer stage. The single stage would help to obtain a very low net positive suction head to minimize vapor formation. The pumps would be of the submerged motor type, with the motor windings cooled by the pumped LNG. The LNG also would lubricate and cool the pump and motor bearings. The rated capacity would be approximately 5,600 gallons per minute.

Other Shipboard Systems. The SRVs would be equipped with all normal shipboard systems, such as a bilge and ballast system, safety equipment, lifesaving equipment, firefighting equipment, deck lighting,

navigation aids, and all other equipment needed for compliance with the applicable codes, standards, and regulations. These would include the following:

- Cargo leak detection. Any small cargo leakage within the membrane interbarrier space would be detected at an early stage by the gas detection system. The gas detection system would continuously monitor the interbarrier space by circulation of nitrogen within the space. Should a leak occur, it would be detected. Cargo would be restrained from coming into contact with the inner hull of the SRV by the secondary barrier membrane. An assessment of the leak could then be made and any special recovery measures, such as emptying the tank concerned, could be implemented.
- Emergency Shutdown (ESD) System. The ESD system would be designed to ensure a controlled shutdown of LNG equipment to avoid any unsafe conditions. It would be essential that the machinery be stopped and valves closed in the correct sequence to avoid any pressure or temperature surges that might exceed the design limitations of process or pipeline systems.
- Accommodation and machinery spaces gas detection system. This gas detection system would monitor the accommodation and machinery space areas of the ship. The range of measurement would be from 0 to 100 percent Lower Explosion Limit. The system would normally continuously scan the locations sequentially 24 hours per day, 7 days per week. In addition, a separate gas detector would be installed for continuous monitoring of gas supply to the main boilers.
- Cargo areas gas detection system. A separate gas detection system would cover the LNG insulation spaces and cargo area compartments. The control unit would be similar to the accommodation and machinery spaces gas detection system.
- Fire detection and alarm system. The fire detection system would be computerized with a fully addressable analogue fire alarm system and analogue detectors. The central control unit with back-up battery, operating panel, and power supply would be contained in a central cabinet on the bridge. There would be a repeater panel in the fire control headquarters. The system would be interfaced to the Distributed Control System which would indicate loop status and could control the fire pumps. The operator also would access deck plans indicating the exact location of individual detectors. The system would use a wide range of detectors and sensors to suit different needs and conditions. It would include detectors with different alarm parameters (for example, ion and optical smoke detectors, heat and flame detectors, manual call points, short circuit isolators, and timers where required). The detectors would be wired in a loop configuration with four loops in total. A fault in the system or a false alarm would be detected immediately because the function of the detectors and other installed loop units would be tested automatically and continuously.

Surface Requirements. Under the DWPA implementing regulations, the USCG is authorized to establish a permanent mandatory Safety Zone around deepwater ports whether a vessel is present or not. The Safety Zone would extend approximately 850 m (2,789 feet) from the center of each buoy and encompass approximately 561 acres. This is a result of maintaining 500 m (1,641 feet) from the moored LNGC (maximum of approximately 350 m [1,148 feet] length) as it weathervanes (rotates) around the buoy. All unauthorized vessels would be prohibited from anchoring or transiting the proposed Safety Zone at any time. The USCG would have the primary jurisdiction for the Safety Zone.

If a License is issued, the USCG may designate a mandatory No Anchoring Area (NAA) and recommendatory area to be avoided (ATBA) to further facilitate Port operations, safety, and security. The NAA restrictions would extend beyond the buoy anchors with an approximately 1,000-m (3,280-foot) radius around each of the buoys. The ATBA would extend with an approximately 1,200-m (3,937-

foot) radius around each of the buoys, and would include the area between the buoys. The Safety Zone, ATBA, and NAA for the Port are shown in **Figure 2.3-11**.

The NAA is necessary to prevent vessels from anchoring (or bottom trawling) within the Port's mooring system and damaging the mooring system, the vessel itself, or its equipment. The ATBA would represent an advisory notice to mariners to seek alternate routes around the area if possible. The USCG would not prevent vessels from crossing the ATBA, but they would be expected to maintain a predictable course at a speed of 10 knots or less. Activities that would not threaten port operations or navigational safety, such as fishing and transiting through the ATBA by recreational boaters, would be allowed within the ATBA. The Applicant would be encouraged to develop communications protocols with parties who have an interest in transiting the Project area such as fishing or recreational boating.

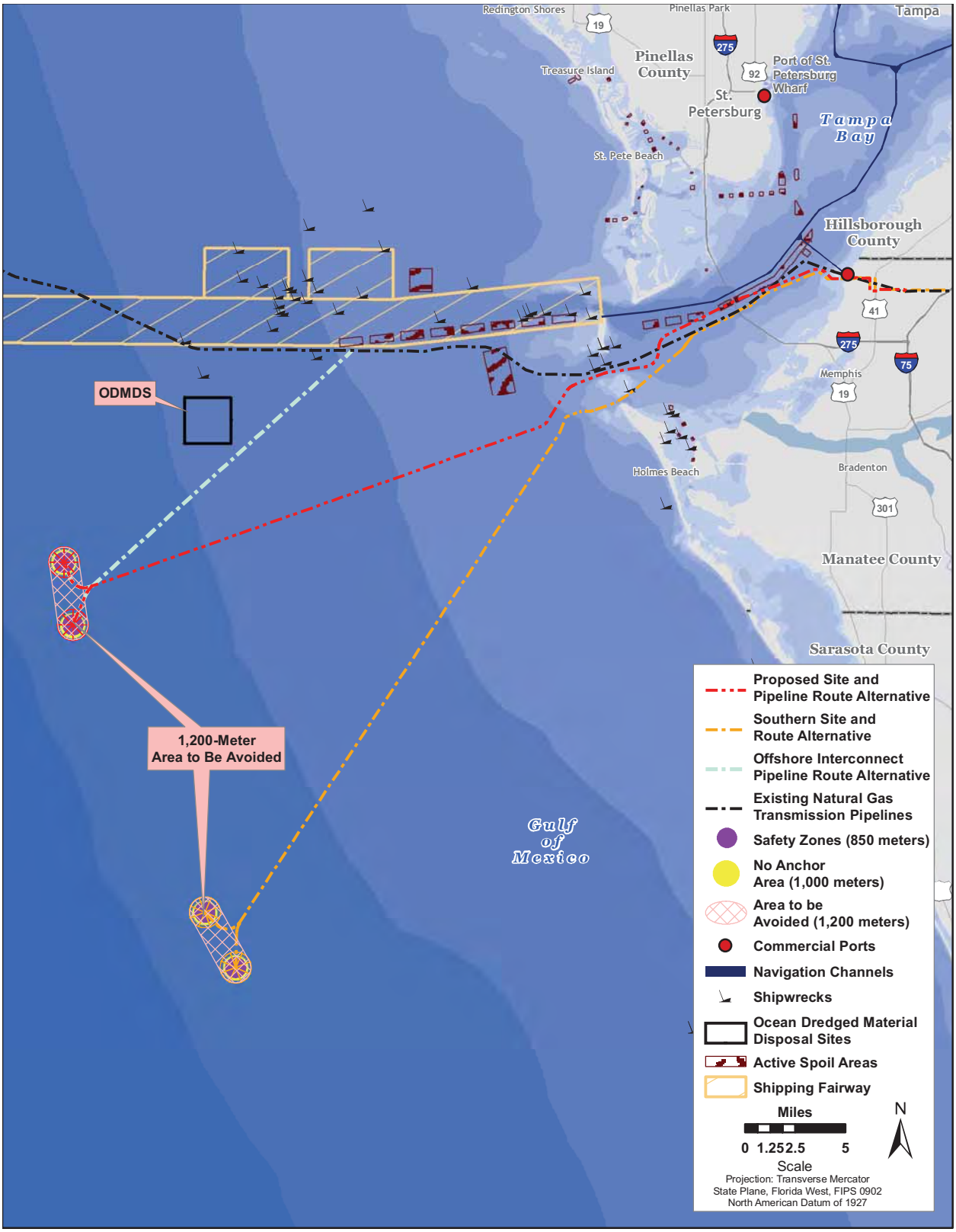
If the License is approved, the USCG, in working with the Applicant, could determine that additional operational restrictions such as a Precautionary Area are required. NAAs, ATBAs, and other restrictions need to be proposed to and approved by the IMO if they extend beyond the 19-km (12-mi) limit. The Applicant would be encouraged to develop communications protocols with parties who have an interest in transiting the Project area such as fishing or recreational boating. A notice of any operational restrictions or area designations would also be placed in the *Federal Register*.

Mooring Line Break Detection. Monitoring of possible mooring line failure would be based on the change in mean turret offset position. If the mean turret offset position from the latest 30 minutes deviates more than 1.98 m (6.5 feet) from the previous 30 minutes mean turret offset position, then there would be a potential line breakage in one of the windward lines. Both averages would be updated for each DGPS reading and displayed on a monitor. A line failure alarm could either be given automatically or based on visual monitoring of the two mean offsets. In case of visual monitoring, this should be performed approximately every 30 minutes. The system would be designed for single line failure, and therefore disconnection would not be necessary immediately upon detection of a potential line failure.

Navigational Lighting. While attached to the unloading buoy, the SRV would be considered "a vessel at anchor." Accordingly, it would exhibit the light and sound signals appropriate to a vessel at anchor in accordance with International Regulations for Prevention of Collisions at Sea (COLREGS). Thus, the SRVs at anchor would exhibit one all-round white light in the fore part and one all-round white light at or near the stern and at a lower level than the light in the fore part. The SRV would also use the available working or equivalent lights to illuminate her decks. To minimize impacts on marine animals, all lighting would be installed and used in accordance with the USFWS guidelines in **Section 4.2.**

The messenger retrieval line for the submerged buoy, which would float on the surface of the water when an SRV is not connected, would be provided with two lighted buoy markers. The lighted buoy markers would be used to assist during retrieval of the buoy by the SRV and to alert vessel traffic of the presence of the floating messenger line when an SRV is not on station. The lighted buoy markers would be fitted with flashing yellow lights.

Pollution Prevention Equipment. There would be no ship-to-ship fuel oil transfer operations at the Port, minimizing the possibility of fuel spill. Coamings (approximately 7.6 to 10.2 cm [3 to 4 inches] high) would be built around hydraulic deck machinery (winches and cranes) and associated piping on deck to contain potential leakage. While moored at the Port, the deck would be patrolled by the crew around the clock. In addition, all deck areas would be continuously monitored by closed-circuit television cameras from the cargo control room and the bridge. In this way, the vessel would be able to respond immediately if any leak should occur. Oil spill recovery equipment would be deployed adjacent to possible sources for hydraulic oil spills. Such equipment would include sawdust, shovels, and portable pumps (connected for



Sources of Proposed Pipeline: ConShelf 2009; Southern Pipeline: ConShelf 2007; Offshore Interconnect Alternative and Precautionary Area: e²M, Inc. 2008; Safety Zones and No Anchor Areas: e²M, Inc. 2009.

Figure 2.3-11. Potential Safety Zone, ATBA, and NAA

immediate use). Any spilled oil (contained in coamings) would be pumped into storage drums and retained on board for transportation to a shore disposal or recycling facility. In addition to these measures, the Port would operate under the provisions of an approved oil spill contingency plan.

Waste Treatment Equipment. Each SRV would be equipped with an approved sewage treatment unit sized to suit the SRV quarters' capacity. While at the Port, discharge from the sewage treatment unit and other accommodation drains would be collected in a tank for later disposal at sea, away from the Port and in accordance with international regulations. Bilge drains in engine and machinery spaces would be directed to an oily bilge holding tank. An emulsion-breaking oily water separator in compliance with the latest rules and regulations would be fitted. While at the Port, the bilge would be retained in bilge holding tanks. During sea voyage, the oily bilge separator would reduce the oil content to less than 15 parts per million (ppm). The separated oil would be stored in holding tanks for disposal onshore at the LNG loading location or sent to the shipboard incinerator. The incinerator would be used to dispose of contaminated fuel waste cleaning materials, oil, and any oil recovered from the machinery space bilge separating system. All trash from the accommodations, including plastic, would be compacted and returned to shore for proper disposal.

Fuel Bunkering of SRVs. No vessels would be used for bunkering of fuel or LNG into SRVs that use the Port.

Shore-Based Support. A dedicated support vessel and a dedicated crew boat would be used for monitoring and control purposes and occasional supply and personnel transfer. It would be expected that these vessels would be ocean-class towing vessels up to approximately 44.2 m (145 feet) long, 12.2-m (40-foot) beam, and 6.7-m (22-foot) draft, powered by up to two diesel engines with up to 7,000 horsepower. The vessels would be equipped with firefighting equipment. They would be able to rescue tow an SRV in up to Beaufort 5 conditions and perform security functions. The support vessels would operate from an existing dock facility in Tampa Bay. The deepwater port would receive commercial, logistics, legal, operations, and administrative support from offices in Tampa Bay, Florida, that would be contracted in existing commercial space.

2.3.11 Construction and Installation

Construction of the components for the Port would occur at seaside or upland areas, and installation would occur at the ocean site. This work would comply with relevant environmental, pipeline, maritime, and coastal regulations governing the construction process. The following provides details on these matters.

Fabrication, Storage, and Handling. The first step in construction would be ordering pipe and other material and preparing fabrication contracts based on final design and specifications for major components of the deepwater Port. Fabrication contractors for major components would be selected through an international solicitation process. Major components would include the following:

- SRVs. The SRVs would be built at an international shipyard that has extensive and recent experience in the design and construction of SRVs. The shipyard would have the capability to install the vaporization facilities and the mating cone for the unloading buoy.
- Mooring System and Unloading Buoys. The major components would be custom-fabricated, based on the final engineering design and specifications, at worldwide manufacturing facilities that have expertise and experience in manufacturing offshore mooring systems and buoys.
- Pipeline Components. PLEM pipe for the flowlines and transmission pipeline, as well as vessels, meters, and other components for the interconnection station, would be fabricated, based on the

final engineering design and specifications, at worldwide manufacturing facilities that have expertise and experience in manufacturing subsea pipeline components. The piggable–Y and other components would most likely be manufactured at an existing GOM facility.

The manufactured components would be shipped to the region, and stored temporarily at an existing onshore staging yard (typically at or near the dock of a nearby port, such as Port Manatee). Quality assurance and inspections would be conducted at the site of manufacture to ensure the components meet engineering design specifications. These components would include anchor piles, mooring lines, concrete-coated flowline and gas transmission pipeline, PLEMs, spool pieces, unloading buoys, flexible pipe risers, and other equipment.

Offshore Preconstruction Activities. The following activities would be accomplished prior to start of construction operations:

- Applicant submits construction plan to USCG
- Geotechnical and Hazard surveys completed
- Evaluation of fair market value (FMV) and clearance of the Project footprint (including project pipeline); issuance of an MMS Segment Number, clearance letter, or other evidence that the Project does not conflict with planned or existing OCSLA regulated facilities or activities
- Development and approval of detailed construction procedures
- Pre-lay survey of pipeline routes and anchor placement plans
- Placement of marker buoys and transponders on the seafloor (if required)
- Final coating of piping.

Offshore Construction Sequence. It is anticipated that the installation effort would be accomplished in the following sequence:

- Mobilize the Main Installation Vessel, an offshore crane, an anchored lay barge for the pipeline ROW route, and pipe-laying vessel with plow, pile-driving equipment, and workboats from either Louisiana or Texas. Mobilization would be staggered, as the travel times to Tampa Bay would be different for each piece of equipment.
- Install the Port Manatee HDD. This would be installed from onshore to the offshore location.
- Construction and installation of the HDD pipe sections for the drills under the Gulfstream pipeline.
- Install pipe segments between Port Manatee HDD and the Gulfstream HDDs.
- Install the Skyway Bridge section of the pipe. This would require dredging through the causeway.
- Perform pipelay and diving operations towards the piggable-Y.
- Install the flowlines on the seafloor.
- After all tie-ins are complete, the pipeline would be buried or concrete mattresses would be installed where necessary.
- Testing of the pipeline would be conducted upon completion of the burial operations. This would include pigging the pipeline and then hydrostatically testing the line.
- Install the north and south PLEMs with pig receivers.

- Install the anchor piles and the mooring lines using the Main Installation Vessel.
- Install the STL Buoys.
- Install the two risers from the PLEMs. Demobilize the offshore construction equipment.

Description of Offshore Construction Equipment. A shallow-water lay barge, spud barge and clamshell dredge, and a jack-up barge would be mobilized for offshore pipe-laying activities. This equipment would be used where conventional installation methods are anticipated. An HDD spread, including four jack-up barges, three hopper barges, and two tugs for barge towing, would be used for the three planned HDDs. Four diving support vessels would also support tie-in and mattressing operations. All vessels would likely come from the GOM. Construction equipment would make one round trip to the Project location, staying on location for the duration of the Project. Work crew vessels and supply vessels would make on average two trips a day for the duration of offshore construction. Work crew and supply vessels are expected to make between 420 and 450 roundtrips to the offshore construction location from shore-based facilities for the duration of the Project.

Onshore Construction Methods. The Applicant would construct and install the onshore portion of the pipeline using the following methods: open trench, joint-by-joint stalking, HDDs, slick bore, and dry jack and bore (described below). Each construction method proposed for use by the Applicant is the industry standard for safe and effective pipeline installation. Each method involves different logistical considerations, specific construction equipment, work space requirements, and special considerations in order to install the pipeline (Port Dolphin 2008b).

- Open Trench. A method in which a trench is opened with a hydraulic excavator, a string of line pipe is welded out, a line pipe string is lowered in the open ditch with a pipelayer, and a track-type blade tractor is used to cover the excavation.
- Joint-by-Joint Stalking. Essentially the same as the open trench method, but the length of the pipe string is reduced due to special construction considerations.
- Horizontal Directional Drill. A method used to install pipe under areas that are inaccessible by the open trench method or that need to be avoided. Typical areas where HDD is used include rivers, streams, and environmentally sensitive areas.
- Dry Jack and Slick Bore. Boring or jacking are methods that use a horizontal jack to install the pipe in one pass. A hydraulic jack pushes the pipe segment by segment through the soil from a jacking pit to a receiving pit. Soil is excavated mechanically or manually at the pipe's leading edge.

Onshore Construction Sequence. The following list of activities would constitute the onshore construction sequence:

- Mobilize onshore construction equipment such as backhoes, dump trucks, cranes, bulldozers, and sidebooms
- ROW clearing, grubbing, and grading
- Unload and lay (string) the pipe along the corridor
- Ditching
- Install the onshore pipeline using open trench, joint-by-joint stalking, HDDs, slick bore, and dry jack and bore
- Make tie-ins and install cathodic protection test sites

- Backfill the ditch
- Conduct hydrostatic testing
- Dewater and dry the pipeline
- Install pipeline markers and signs
- Clean up and restore the work areas.

Description of Onshore Construction Equipment. Standard onshore pipeline construction equipment would be used for the onshore pipeline. Equipment would include backhoes, dump trucks, cranes, bulldozers, and side-booms. Side-booms are specially designed tractors with counter weights that have the capacity to lower segments of pipe into a trench. Special equipment would be used to bore under improved roadways and use the HDD under sensitive areas such as the FPL tank farm.

Functional Testing. During the construction of the SRVs and fabrication of the unloading buoy components, mating checks would occur to confirm the SRV is properly moored to the unloading buoy and that all piping has been pressure-tested in accordance with appropriate standards and requirements. Upon completion of offshore construction and availability of an SRV, the SRV would perform a trial connection to each unloading buoy and would verify the functionality of all components prior to initiating any discharge operations. The purpose of the functional testing would be to verify that all components are compatible and would function as designed, prior to the vaporization of LNG and send-out of natural gas. Particular attention would be given to the following:

- Confirmation of the operation of the unloading buoy acoustic position reporting system
- Onsite verification of the SRV thrusters and the dynamic positioning system
- Verification of the unloading buoy retrieval into the mating cone of the SRV and the mechanical connection between the SRV and the unloading buoy
- Verification of mooring line tensions in comparison with the predicted values
- Function test and verification of the gastight connection between shipboard equipment and the unloading buoy turret
- Confirmation of the ESD and the emergency buoy disconnect systems
- Verification of SRV disconnect from the unloading buoy.

Construction Schedule. Construction of the deepwater port and pipeline is expected to take 11 months. Many of the construction activities would be conducted in parallel to meet the in-service date. Construction of the pipeline would start from the interconnection stations and move towards to the Port. Start-up of commercial operations is expected in mid 2011. Total onshore construction is expected to be completed in 20 weeks (Port Dolphin 2008b).

2.3.12 Decommissioning

The Port would be designed to have a service life of 25 years. At the end of that period, the principal elements of the Port would be decommissioned.

Shuttle and Regasification Vessel. The SRV would be decommissioned by transporting it to a suitable facility for removal of LNG equipment that would be used on other LNGCs or shoreside facilities, or for salvage. The ship would likely be converted to another type of use. At the end of its useful life as a seagoing vessel, it would likely be salvaged for recycling of metal and other materials.

Unloading Buoy. At the end of the economic life of the Port, the subsea valves would be closed, the risers and control umbilicals would be disconnected from the riser manifolds, and the mooring lines would be disconnected from the unloading buoys and from the anchor points. Such major components would be removed from the Project area.

Offshore Pipeline System. The pipelines would be decommissioned in place. The owner of the pipelines would submit a pipeline decommissioning application to the MMS Regional Supervisor in accordance with 30 CFR §250.1750 through §250.1754. The MMS Regional Supervisor would determine whether the pipelines would constitute a hazard obstruction to navigation and commercial fishing operations, would unduly interfere with other uses of the OCS, or would have adverse environmental impacts. Decommissioning would include the following:

- Closing hot tap valves and plugging the end
- Pigging and flushing the pipelines
- Filling the pipelines with seawater
- Removing the manifolds and tie-in spools
- Cutting and plugging each end of the pipelines
- Burying each end of the pipelines under at least 1 m (3 feet) of cover or covering each end with protective concrete mats, if required by the MMS Regional Supervisor.

Onshore Pipeline System. Onshore portions of the pipeline and aboveground facilities would be decommissioned through the FERC abandonment process in accordance with FERC rules applicable at the time the Applicant applies to FERC to decommission the onshore pipeline.

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3. Affected Environment

The CEQ defines the affected environment as the portion of the EIS that "succinctly describes the environment of the area(s) to be affected or created by the alternatives under consideration" and states that those descriptions "…shall be commensurate with the importance of the impact, with less important material summarized, consolidated, or simply referenced" (40 CFR 1508.15).

In general the proposed Project would affect water, biologic, geologic, marine land, air quality and cultural resource areas off the western coast of Tampa Bay, the inlet passage to Tampa Bay, the nearshore waters and land in Manatee County, Florida. It would also impact navigation and transportation, noise, recreation and aesthetics, and socioeconomic resources in these areas. In the following sections, each of these resource areas is described in detail.

3.1 Water Resources

3.1.1 Definition of the Resource

For purposes of this assessment, water resources that might be affected by installation, operation, and eventual decommissioning of the Port and pipelines within the Project area encompass marine waters of the nearshore and offshore portions of the OCS near Tampa Bay, and groundwater and surface water resources associated with the 6.4-km (4-mi) onshore pipeline.

Marine waters, as defined in this document, include waters extending from 4.8 km (3 mi) offshore seaward to the Exclusive Economic Zone (EEZ) in the vicinity of the Project site, in Federal waters of the OCS, MMS PB blocks: PB545, PB546, PB547, PB548, PB504, PB505, PB506, PB507, PB463, and PB589 (see **Figure 2.3-4**), approximately 45 km (28 mi) offshore of Tampa, Florida, near 27.24°N/-83.12°W, in a water depth of approximately 30 m (100 feet). The region of influence for impacts to water resources within these marine waters includes the area within and directly adjacent to the Port location and the offshore pipeline route.

Groundwater resources potentially affected by this Project include aquifers, watersheds, and supply wells accessed by the public for drinking water, agriculture, and other uses. Surface water and wetland resources addressed in this document include those defined in the FERC Procedures (see **Section 2.3.9**). For this assessment, a waterbody is defined as any natural or artificial stream, river, or drainage with perceptible flow at the time of crossing, and other permanent waterbodies, such as ponds and lakes. The State of Florida has defined a surface water or waterbody as any water contained in bounds created naturally or artificially, including the Atlantic Ocean, the GOM, bays, bayous, sounds, estuaries, lagoons, lakes, ponds, impoundments, rivers, streams, springs, creeks, branches, sloughs, tributaries, and other watercourses.

Evaluation of existing water quality conditions is done by direct measurement of factors that are considered important to the health of the ecosystem or the existing or intended water use. For all of the water resources that could potentially be affected by this Project (marine, estuarine, fresh, and groundwater), the baseline water quality constituents include temperature, salinity, dissolved oxygen, nutrients, pH, hardness, contaminants, and turbidity (the load of suspended matter as it relates to water clarity). Trace constituents such as metals (inorganic) and organic compounds also affect marine water quality.

Altering the functions and values of the water resources through changes in these water quality parameters would constitute an impact. Such impacts could affect human health, and commercial and

recreational water use. Ecological impacts could result in population reductions of specific species, support of undesirable or exotic species, and possibly mass mortality. Such effects can either be localized or widespread.

The primary values that affect water quality are water temperature, total dissolved solids (salinity), suspended solids (turbidity), and nutrients. In marine and terrestrial waters, salinity and temperature parameters are affected by hydrodynamic mechanisms governed by the interaction of marine and terrestrial influences, including tides, nearshore circulation, freshwater discharges from rivers, and local precipitation. For fresh surface water and groundwater associated with the onshore portions of the Project, these parameters are primarily affected by interaction between the water and the soil or aquifer material, as well as by influx of precipitation. In addition to these natural inputs, human activities can affect water quality through a series of mechanisms including discharges, runoff, burning, dumping, air emissions, and oil or chemical spills. Local or regional water quality is determined by the relative contributions of natural processes (e.g., riverine input, nearshore currents, and mixing processes) and periodic or chronic anthropogenic inputs. Significant deviation from the natural variability in any of the parameters can adversely affect human and or ecological uses of the water, and can cause either localized or widespread alterations in indigenous populations and associated habitats.

3.1.2 Physical Setting

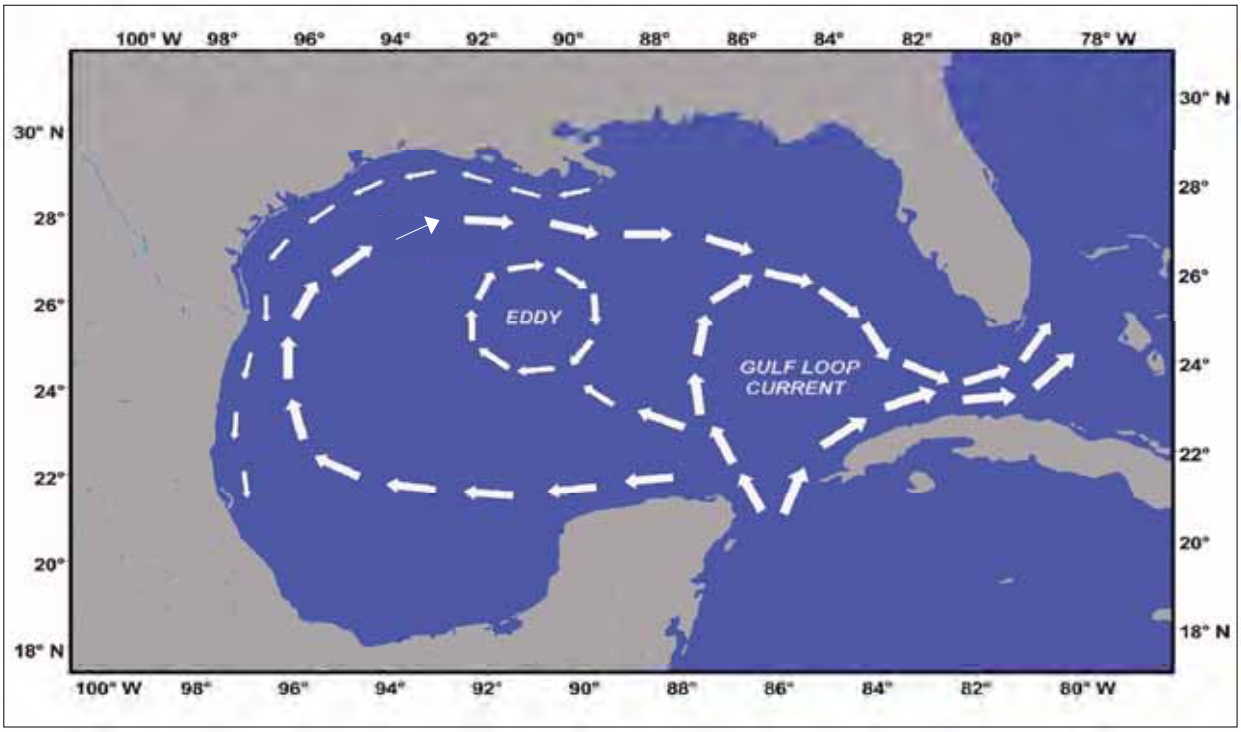
3.1.2.1 GOM Oceanography

The GOM is a marine waterbody bounded by Cuba on the southeast; Mexico on the south and southwest; and the U.S. Gulf Coast on the west, north, and east. The GOM has a total area of 564,000 square kilometers (km^2) (217,762 square miles [mi^2]). Shallow and intertidal areas (water depths of less than 20 m) compose 38 percent of the total area, with continental shelf (22 percent), continental slope (20 percent), and abyssal (20 percent) composing the remainder of the basin. The Project Site location is presented in **Figures 2.3-1, 2.3-2,** and **2.3-3.** The Project Site is located on the west Florida Shelf, a portion of the Inner Continental Shelf, an area of relatively low wave energy and tidal variation (Gore 1992).

The Gulf is separated from the Caribbean Sea and Atlantic Ocean by Cuba and other islands, and has relatively narrow connections to the Caribbean and Atlantic through the Florida and Yucatan Straits. The Gulf is composed of three distinct water masses, including the North and South Atlantic Surface Water (less than 100 m deep), Atlantic and Caribbean Subtropical Water (up to 500 m deep), and Subantarctic Intermediate Water.

Circulation within the GOM, and within the Project area, is dominated by the Loop Current, depicted in **Figure 3.1-1**. The Loop Current enters the GOM through the Yucatan Strait, flows towards the south along the Florida coast in the vicinity of the Project area, and exits the GOM through the Florida Straits. The velocity of the current in the Project area ranges between 1.56 and 15.16 cm per second in summer, and 1.79 to 25.36 cm per second in winter (APL 2006). The direction of flow in the Project area is generally south to southeast.

In shallow areas along the west Florida shelf, additional influences on water flow and circulation include wind stress, freshwater inflow, and variations in buoyancy (Gore 1992). Wind speeds at the Project Site range from 2.26 to 7.61 m per second in summer, and 2.85 to 11.04 m per second in winter (APL 2006). Tidal variation along Florida's west-central continental shelf is moderate, with an average range of approximately 2 feet (Gore 1992).



Source: NOAA 2007

Figure 3.1-1. Loop Current Flow within the GOM

Along the eastern edge of the Loop Current along the west Florida shelf, circulation patterns result in an upwelling of deep nutrient-rich water. This upwelling supports a high level of biological activity, producing large concentrations of plankton. Nutrient levels (primarily nitrogen and phosphorus) are also affected by runoff from agricultural and urbanized areas and from submarine groundwater discharge, leading to red tide conditions. In the Project area, red tide occurs on an almost annual basis (Hu et al. 2006). Red tides are caused by rapid growth of the species *Karenia brevis*, a toxic species which produces brevetoxins (a type of neurotoxin) that can accumulate in bivalves and cause mortality in marine organisms (Hu et al. 2006). The rapid growth of these organisms can also create a hypoxic zone (area with dissolved oxygen concentrations below 2 milligrams per liter [mg/L]), which can cause mortality among benthic communities, fish, turtles, birds, and marine mammals (Hu et al. 2006).

Extreme variations in water circulation patterns, tides, and wave heights can occur along the west Florida coast during periodic tropical storms and hurricanes. Warm water within the Loop Current can act as an energy source in summer and fall months, fueling the development of these storms. Features of these storms that can affect the natural circulation and topography include high winds, flooding, storm surges, and beach erosion.

3.1.2.2 Tampa Bay

Tampa Bay is an estuary formed by the rise of sea level into a former river valley. Tampa Bay consists of four subregions, including lower Tampa Bay, middle Tampa Bay, Old Tampa Bay, and Hillsborough Bay. The Project area would only occur at Port Manatee, within Lower Tampa Bay, near the outlet of the bay into the GOM. The bay covers an area of 1,030 km^2 within Hillsborough, Manatee, and Pinellas counties. Freshwater inflow to the bay occurs through four major river systems (Alafia, Hillsborough, Little Manatee, and Manatee), as well as more than a hundred minor creeks and rivers.

Water circulation within the bay is driven by freshwater inflow, tides, and winds. The bay has an average depth of 3.5 to 4 meters. The bay has well-developed horizontal stratification, with fresh water flowing along the surface out to sea, and denser saline water flowing into the bay along the bottom.

The Tampa Bay area has a population of more than 2 million people, and tributaries, habitat, runoff patterns, and water quality are all affected by urbanization. Specific actions that have affected the bay include removal of mangroves, dumping of sewage, artificial filling, and modification of runoff from paved surfaces (Peene et al. 1992).

3.1.2.3 Onshore Groundwater and Surface Water

Water resources within the onshore portion of the Project area include groundwater resources, surface waterbodies, and wetlands.

Groundwater resources along the onshore portion of the Project area exist within three separate aquifer systems. At the surface, the Surficial Aquifer System (SAS) consists of undifferentiated soils and the Peace River Formation, which compose a thickness of approximately 13 meters of silty and clayey sands. The SAS is unconfined, and is found within a few meters of the ground surface. The Intermediate Aquifer System (IAS) is composed of permeable zones within the Arcadia Formation. This zone is up to 74 m thick, and contains groundwater in confined and semi-confined porous zones. The Floridan Aquifer System (FAS) is a major regional aquifer which acts as the major water supply source for public, industrial, and irrigation purposes in Manatee County and adjacent areas of central Florida. The FAS is more than 300 meters thick, and contains groundwater within a network of cracks, joints, and solution cavities in several Tertiary-aged limestone units (Brown 1983). Groundwater wells for private water supply purposes are found within 50 m of the pipeline corridor at a location adjacent to Buckeye Road (Port Dolphin 2007b).

The number of wetlands along the proposed pipeline route initially identified in the Draft EIS has been reduced from 11 to 9 due to development in the area, unrelated to this Project, and a refined definition of jurisdictional wetlands. It is important to note that Wetland W-5 was recently disturbed and filled (as of May 13, 2008). No portion of this wetland remains in the Project area. Additionally, the FPL borrow pond was originally delineated as Wetland W-4, but according to both the State and Federal rules, a borrow pond constructed in upland habitat is not jurisdictional. Therefore, both Wetlands W-4 and W-5 are no longer included in the identified wetlands along the pipeline route. The wetlands can be primarily categorized into four classifications: (1) open water, (2) scrub-shrub, (3) emergent, and (4) forested. These classifications include both palustrine (freshwater) and estuarine (saltwater) sites. The total acreage of wetlands that could be disturbed by pipeline installation is 10.71 acres. A detailed discussion and inventory of these wetlands is provided in **Section 3.2.10**.

The pipeline corridor would be constructed in the area of two FDEP-classified surface waterbodies: Piney Point Creek (which would be crossed by the pipeline), and unnamed tributaries to Bishop Harbor. Piney Point Creek is designated as Class III waters, which are defined as waters designated for recreation, propagation, and maintenance of a healthy well-balanced population of fish and wildlife. The tributaries to Bishop Harbor are designated as Class II waters, defined as waters designated for shellfish propagation and harvesting.

3.1.3 Water Quality

3.1.3.1 Introduction

The Project area includes an area within the GOM, the pipeline corridor through the GOM to Port Manatee in Lower Tampa Bay, and the 6.2-km (4-mi) surface-based pipeline corridor from the pier bulkhead at Port Manatee to the proposed Gulfstream and TECO pipeline interconnections. Because the Project area encompasses three distinct geographic areas, resources that might be impacted include water quality in marine, estuarine, and terrestrial (including wetland and groundwater) environments.

Water quality data are available for all three areas through a combination of government agencies, private investigators, and the Applicant. A summary of the data sources is presented in **Section 3.1.3.2**. A summary of the relevant surface water and groundwater classifications and standards is presented in **Section 3.1.3.3**. Summaries of the available water quality data in the GOM, Tampa Bay, and onshore portion of the Project area are provided in **Section 3.1.3.4**.

3.1.3.2 Water Quality Monitoring Programs

For the GOM, existing water quality data are compiled or provided by NOAA's National Oceanographic Data Center (NODC) and the U.S. Naval Oceanographic Office's (USNOC) Generalized Digital Environmental Model. A summary of the available data through these sources for the GOM portion of the Project area is provided in **Section 3.1.3.4**. These data primarily consist of temperature and salinity information.

Water quality data within Tampa Bay are available from several sources, including the Tampa Bay Estuary Program (TBEP) and the U.S. Geological Survey (USGS). The TBEP is a multiagency effort conducted to monitor water quality throughout Tampa Bay. The TBEP is a combined effort of Manatee and Pinellas counties, the Environmental Protection Commission of Hillsborough County (EPCHC), the City of Tampa, the FDEP, Florida Marine Research Institute (FMRI), and the Southwest Florida Water Management District (SWFWMD). The TBEP was established in 1991, and began a program of studies called "Charting the Course" in 1998 (Holland et al. 2006). Through these studies, data regarding temperature, salinity, dissolved oxygen, pH, and nutrients are available. The latest comprehensive summary of water quality conditions in Tampa Bay was provided in the TBEP's *Baywide Environmental Monitoring Report, 1998-2001* (Pribble et al. 2003). These data are summarized in **Section 3.1.3.4**.

Project-specific water quality monitoring programs do not exist for the groundwater and surface water resources associated with the onshore portion of the Project area. Water quality in surface water tributaries to Tampa Bay is monitored by the FDEP. Existing data on water quality related to the onshore portion of the Project area are provided in **Section 3.1.3.4**.

3.1.3.3 Water Quality Regulations, Classifications, and Standards

The Project area would include components constructed and operating within Federal waters outside the state water boundary, within state waters, and onshore. Therefore, a variety of international, Federal, and state standards apply to various components of the proposed Project.

The Port itself, which would be the location of vessel operations, would be 45 km (28 mi) offshore. Therefore, discharges during vessel operations would be governed by the protocols defined by MARPOL. Federal requirements for facility construction and operation would include the following:

- National Pollution Discharge Elimination System (NPDES) permit administered by USEPA
- Operational guidelines for discharges administered by the USCG
- U.S. Rivers and Harbors Act Section 10 and CWA Section 404 permits administered by USACE
- A Joint Coastal Permit administered by USACE and FDEP.

Additional state regulatory requirements would apply to the nearshore and onshore portions of the Project area. Under Section 403.061(27) Florida Statutes, the FDEP was granted authority to designate Outstanding Florida Waters (OFW) to waterbodies which are worthy of special protection because of their natural attributes. For locations designated as OFW, FDEP cannot issue permits for direct pollutant discharges which would lower ambient water quality conditions, or indirect discharges that would degrade water quality for OFW. Under this regulation, permits for dredging and filling are only issued when clearly in the public interest, considering a variety of criteria that are protective of the OFW. In the Project area, OFW has been designated for areas within Lower Tampa Bay, Middle Tampa Bay, and the Manatee River. The pipeline corridor would pass directly through OFW in the area near the Terra Ceia AP.

3.1.3.4 Water Quality Monitoring Results

The trends and characteristics of conventional and toxic water quality parameters (e.g., temperature, dissolved oxygen, ammonia, nitrate, phytoplankton, clarity, and salinity) in the Project area are discussed below. The discussion is limited to those parameters that might be influenced by the Project.

GOM

Water. As described above, water quality and physical parameters in the GOM are influenced by regional meteorological and oceanographic conditions. Water quality parameters such as temperature and salinity vary on an annual cycle in response to changes in air temperature and circulation. In the Project area, temperature varies from an average of 16.7 °C for the month of January to 30 °C in August (NODC 2007). Temperature variations are greatest in the surface waters shallower than 10 m, with a seasonal thermocline developing during the months of May to August. During winter months, the difference in water temperature between surface (less than 10 m) and deeper water is approximately 1 to 2 °C, while the difference in summer months can be up to 6 to 7 °C (NODC 2007).

Salinity within the GOM near the Project area is approximately 35 to 36 parts per thousand (ppt). The salinity varies by location based on the proximity and volume of fresh water input. Salinity also varies seasonally based on circulation patterns from the Caribbean Sea, which has a higher salinity (up to 36.6 ppt) and has an increase of influx during the spring months (Gore 1992).

Dissolved oxygen data from the GOM are available through the USNOC NODC. The average dissolved oxygen concentration in the GOM is approximately 5 mg/L, which is a value that is sufficient to support healthy aquatic populations (NODC 2007). Some areas of the GOM, especially in the area of the Mississippi River, have dissolved oxygen levels that are too low to support aquatic organisms, and are referred to as dead zones. However, the dead zone associated with the Mississippi River discharge does not affect conditions in the Project area.

Turbidity and total suspended solids (TSS) concentrations in the GOM are primarily affected by suspension of sediments following storms, plankton blooms, and human factors such shore-based runoff or discharge of ship wastes, including gray water and sewage. No turbidity or TSS data specific to the GOM portion of the Project Site are available.

No data on toxic parameters such as metals or polychlorinated biphenyls (PCBs) have been collected for the specific Project area within the GOM. The Applicant has not conducted site-specific water column sampling. The general area has been subject to sampling investigations for other purposes. Beginning in 1974, the U.S. Department of the Interior performed the Eastern GOM OCS Benchmark Study to develop a baseline from which to evaluate impacts of oil and gas activities in the Mississippi, Alabama, and Florida (MAFLA) region. The objective of these studies was to identify concentrations of hydrocarbons and selected trace metals in the water column, sediments, and selected benthic microfauna. The study determined that the ecological, histopathological, and histochemical condition of the MAFLA area was pristine and healthy.

Sediment. Sediments within both the continental shelf and Tampa Bay portions of the Project area consist of a mixture of quartz sands eroded from older deposits and biogenic carbonates. The mean grain size of the sediment ranges from 0.18 to 0.5 mm, and is classified as fine- to medium-grained sand (Brooks and Doyle 1998). Overall, 82 to 96 percent of the sediment is classified as sand, with the remainder consisting of silt and clay (Locker et al. 1999).

Tampa Bay

Water. With a population of more than 2 million people, water quality in the Tampa Bay area is substantially influenced by urbanization. Habitats within the estuary, including mangroves, salt marshes, and submerged aquatic vegetation, have been affected by dredge and fill activities and degradation of water quality through agricultural runoff and sewage disposal. In recent years, improved wastewater and storm water treatment and limitations on dredging and filling have lead to an improvement in water quality conditions in the estuary (TBEP 2007).

Through the TBEP, water quality parameters routinely measured in Tampa Bay since 1974 include chlorophyll, phosphorus, nitrogen, salinity, temperature, turbidity, and dissolved oxygen. The only clear temporal trend in water quality is a general improvement, as indicated by a decrease in phosphorus concentrations. Comparison of the water quality measurements between the different portions of Tampa Bay indicate that Lower Tampa Bay (the location of the Project area) typically has better water quality than middle Tampa Bay, Old Tampa Bay, or Hillsborough Bay. This could result from the fact that Lower Tampa Bay is not as industrialized as the other portions of the bay, and is also subject to a greater degree of flushing due to its locations closer to the GOM.

Chlorophyll concentrations in Tampa Bay are an indicator of water clarity and biological productivity. The chlorophyll concentration in Lower Tampa Bay, near the Project area, has remained steady at approximately 5 micrograms per liter since measurements began in 1974 (Pribble et al. 2003). The concentrations in Lower Tampa Bay are lower than those in other parts of Tampa Bay, indicating higher water clarity near the mouth of the bay.

Phosphorus concentrations in the estuary are primarily due to man-made input from sewage treatment and phosphorus chemical plants, and have decreased from about 0.6 mg/L to 0.1 mg/L since 1974 (Pribble et al. 2003). Nitrogen is the primary pollutant in Tampa Bay, resulting from storm water runoff and agricultural runoff. Total nitrogen concentrations in Lower Tampa Bay have been variable since 1984, with no clear increasing or decreasing trend. Similar to chlorophyll, nitrogen and phosphorus concentrations are lower in Lower Tampa Bay than in the other portions of Tampa Bay. This appears to indicate that Lower Tampa Bay is not as affected by urbanization or is more prone to flushing due to its proximity to the GOM.

Similar to the GOM, salinity and temperature within Tampa Bay vary on annual cycles. Temperatures in Lower Tampa Bay range from approximately 22 to 30 °C (71.6 to 86 °F) (Yates et al. 2002). Due to the

shallow depth of Tampa Bay, there is little temperature variability with depth. Salinity within Tampa Bay averages approximately 27 ppt; lower than that of the GOM because of the influx of fresh water into the bay. Near Port Manatee, the salinity ranges from 30 to 35 ppt.

Turbidity and TSS within Tampa Bay might be associated with ship traffic, sediment runoff, dredging, or human discharges such as sewage outfalls. Measurements of turbidity within Tampa Bay since 1974 indicate that Lower Tampa Bay has lower turbidity values, and a lower range of values, than the other portions of Tampa Bay.

The Applicant has not conducted site-specific water column sampling within Tampa Bay. Anthropogenic sources of toxic contaminants to Tampa Bay include sanitary sewer wastes, atmospheric deposition from vehicles and industrial emissions, agricultural runoff, discharge from ships, and releases of hazardous substances. The monitoring programs summarized by the TBEP in the *Baywide Environmental Monitoring Report, 1998-2001* (Pribble et al. 2003) provide data only on water quality parameters, and not on toxic parameters.

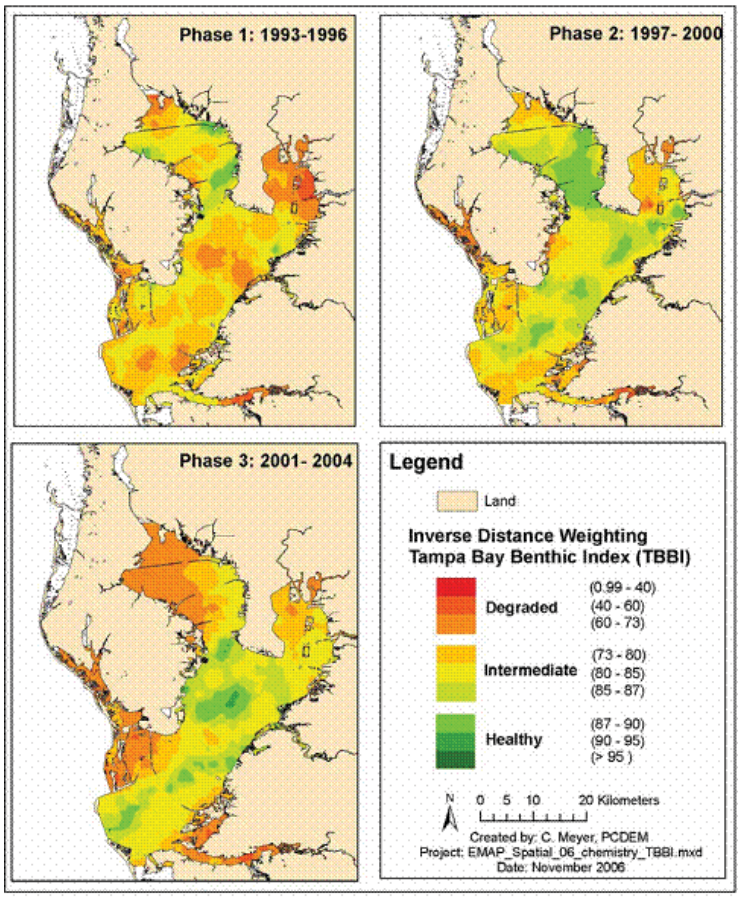
Sediment. The Applicant has not conducted site-specific sediment sampling within Tampa Bay. However, the monitoring programs summarized by the TBEP in the *Baywide Environmental Monitoring Report, 1998-2001* (Pribble et al. 2003) provide data on contamination of sediments within Tampa Bay.

Onshore Groundwater and Surface Water. Groundwater quality in the area of the proposed onshore pipeline corridor could be impacted by past industrial operations. Due to substantial urbanization, Tampa Bay is subject to input of contaminants including metals, pesticides, PCBs, and organic chemicals. However, the TBEP water and sediment quality summary states that Tampa Bay sediments remain relatively free of toxic contaminants, with the exception of hot spots near ports and industrial areas (TBEP 2007). In 2005 and 2006, the TBEP Sediment Quality Assessment Group developed a Tampa Bay Benthic Index to prioritize these hot spots for assessment and cleanup. A review of the most recent data (see **Figure 3.1-2**) indicates that the lower portion of the bay that would be crossed by the proposed pipeline route is classified as healthy to intermediate in water quality. Near the Piney Point Phosphate gypsum stack, removal of impacted groundwater is currently being conducted to prevent offsite seepage of process water (FDEP 2009). In order to avoid this area, the proposed onshore pipeline corridor has been designed to pass south of this area, and is not expected to encounter the groundwater plume (Port Dolphin 2007c).

Surface water quality within the tributaries to Bishop Harbor have been judged to be impaired with elevated levels of coliform bacteria in the water, and elevated levels of mercury within fish. This has led to the Bishop Harbor segment being designated as a low priority for the development of a Total Maximum Daily Load (TMDL) for mercury (FDEP 2007).

3.1.4 Overall Assessment and Conclusions

Water resources within the Project area include surface water, sediment, wetlands, and groundwater within a variety of offshore, nearshore, and onshore environments. Existing sampling data are primarily from Federal, state, and local programs that are not specifically oriented towards the collection of data for the evaluation of this Project. However, the locations of these samples are distributed throughout and adjacent to the Project area, and are expected to be representative of conditions within the Project area. These data indicate that water quality within the GOM is good, but water quality within Lower Tampa Bay and surface waterbodies crossed by the onshore portion of the pipeline corridor exhibit some man-made impacts.



Source: TBEP 2007

Figure 3-1.2. Tampa Bay Benthic Index

3.2 Biological Resources

3.2.1 Definition of the Resource

Biological resources include those species and habitats that could be directly or indirectly affected by construction or operation of the Project unloading buoy system, natural gas flowlines, natural gas transmission pipeline, SRVs, or support vessels (i.e., barges, tugboats, supply vessels). Within the Project area, support vessel operating areas would be defined by existing channel and navigational requirements.

In Notice to Lessees and Operators (NTL) No. 2004-G05, MMS stipulates that prior to drilling or the construction or placement of any structure, a lessee must submit a live-bottom survey report determining the presence or absence of live-bottom communities which could be impacted by the Project. For the purpose of this stipulation, "live-bottom areas" are defined as seagrass beds; areas containing sessile invertebrates (e.g., anemones, bryozoans, coral, hydroids, or sponges) living upon and attached to naturally occurring hard or rocky formations; or areas whose surfaces favor the accumulation of turtles, fish, or other fauna (e.g., lobsters or scallops) (MMS 2004).

Biological resources evaluated for this document include protected or sensitive species and habitats such as marine protected areas (MPAs), benthic communities, marine mammals, sea turtles, coastal and marine birds, plankton, fisheries resources, and federally listed threatened or endangered species. Fisheries resources include fish, ichthyoplankton (fish eggs and larvae), federally managed commercial and

recreational fisheries, and EFH. Determining which habitats and species occur in the Project area was accomplished through literature reviews and coordination with appropriate Federal and state regulatory agency representatives, resource managers, and other knowledgeable experts.

3.2.2 Applicable Regulations, Laws, and Executive Orders

The USCG plays an important role in protecting biological resources by serving as the primary maritime enforcer of U.S. laws within the EEZ. Several of these laws protect marine species and areas, including the ESA of 1973 (16 U.S.C. 1531–1534), MMPA of 1972 (16 U.S.C. 1361 et seq.), Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) of 1976 (16 U.S.C. 1801–1883), and National Marine Sanctuaries (NMSA) of 1974 (16 U.S.C. 1431–1445a). These are described below because they are most directly related to the Proposed Action.

3.2.2.1 Endangered Species Act

The ESA is administered by the USFWS and NMFS and establishes protection and conservation of threatened and endangered species and the ecosystems upon which they depend. Under the ESA, an "endangered species" is defined as any species in danger of extinction throughout all or a significant portion of its range. A "threatened species" is defined as any species likely to become an endangered species in the foreseeable future. "Critical habitat" is designated under the ESA as "a specific geographic area that is essential for the conservation of a threatened or endangered species and that could require special management or protection." Critical habitat can include an area that is not occupied by a species, but is needed for the recovery of that species. A "candidate" species is one that is the subject of either a petition to list or status review, and for which the NMFS or USFWS has determined that listing might be or is warranted. The NMFS is further charged with the listing of all "species of concern" that fall under its jurisdiction. A "species of concern" is one about which the NMFS has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA.

In addition to listing names of species and subspecies, the ESA also allows listing of "distinct population segments" of these species. For example, NMFS policy stipulates that a salmon population would be considered "distinct" for purposes of the ESA it if represents an Evolutionary Significant Unit (ESU) of the biological species. To qualify as an ESU, a population (or group of populations) must be (a) reproductively isolated from other populations of the same species, and (b) an important representative component in the evolutionary legacy of the species.

Section 7 of the ESA requires that all Federal agencies consult with the USFWS or NMFS, as applicable, before initiating any action that could affect a listed species. Section 7 states that any project authorized, funded, or conducted by any Federal agency should not "…jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined to be critical."

During an oil spill event which could affect listed species or critical habitat, emergency consultations under the ESA (50 CFR 402.05) are implemented for oil spill response actions. The Federal On Scene Coordinator (FOSC) initiates the emergency consultation by contacting NMFS and the USFWS. USFWS and NMFS representatives then provide the FOSC with any timely recommendations to avoid or minimize impacts on listed species and critical habitat. They might also be asked by the FOSC to participate within the Incident Command System. It is the FOSC's responsibility to notify USFWS and NMFS representatives in the Incident Command System of changes in response operations due to weather, extended operations, or some other circumstance. If an incidental take is anticipated, and if no means of reducing or avoiding this take are apparent, the FOSC should be advised, the incidental take

documented, and the USFWS and NMFS representatives notified. USFWS and NMFS would continue to offer recommendations, taking into account any changes, to avoid jeopardizing the continued existence of listed species or adversely modifying critical habitat, and to minimize the take of listed species associated with spill response activities.

The major responsibilities of the USFWS and NMFS under the ESA include (1) the identification of threatened and endangered species; (2) the identification of critical habitats for these species; (3) the implementation of research programs and recovery plans for these species; and (4) the consultation with other federal agencies concerning measures to avoid, minimize, or mitigate the impacts of their activities on these species (Section 7). Further duties of the USFWS and NMFS include regulating "takes" of listed species on public or private land (Section 9) and granting incidental take permits to agencies that might unintentionally "take" listed species during their activities (Section 10a). The ESA allows the designation of geographic areas as critical habitat for threatened or endangered species. The physical and biological features essential to the conservation of a threatened or endangered species are included in the habitat designation. Designation of critical habitat affects only Federal agency actions and federally funded or permitted activities.

3.2.2.2 Marine Mammal Protection Act

Under the authority of the MMPA of 1972 (16 U.S.C. §§ 1361 et seq.), the Secretary of Commerce is responsible for the protection of all marine mammals except walruses, polar bears, sea otters, manatees, and dugongs, which are the responsibility of the Secretary of the Interior. These responsibilities have been delegated to NMFS and the USFWS, respectively, and include providing overview and advice to regulatory agencies on all Federal actions that might affect these species.

The MMPA prohibits the "take" of marine mammals, with certain exceptions, in waters under U.S. jurisdiction and by U.S. citizens on the high seas. Under Section 3 of the MMPA, "take" is defined as "harass, hunt, capture, kill, or attempt to harass, hunt, capture or kill any marine mammal." In the 1994 amendments to the MMPA, two levels of "harassment" were defined. "Harassment" is defined as any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild (Level A); or any act that has the potential to disturb a marine mammal or marine mammal stock in the wild by disrupting behavioral patterns, including, but not limited to migration, breathing, nursing, breeding, feeding, or sheltering (Level B). In cases where U.S. citizens are engaged in activities, other than fishing, that result in "unavoidable" incidental take of marine mammals, the Secretary of Commerce can issue a "small take authorization." The authorization can be issued after notice and opportunity for public comment if the Secretary of Commerce finds negligible impacts. The MMPA requires consultations with NMFS if impacts on marine mammals are unavoidable.

Section 101(a)(5)(A) of the MMPA directs the Secretary of Commerce, upon request, to authorize the unintentional taking of small numbers of marine mammals incidental to activities (other than commercial fishing) when, after notice and opportunity for public comment, the Secretary (1) determines that total takes during a 5-year (or less) period have a negligible impact on the affected species or stock, and (2) prescribes necessary regulations that detail methods of taking and monitoring and requirements for reporting. The MMPA provides that the moratorium on takes may be waived when the affected species or population stock is at its optimum sustainable population and would not be disadvantaged by the authorized takes (i.e., be reduced below its maximum net productivity level). Section 101(a)(5)(A) also specifies that the Secretary has the right to deny permission to take marine mammals if, after notice and opportunity for public comment, the Secretary finds (1) that applicable regulations regarding taking, monitoring, and reporting are not being followed; or (2) that takes are, or might be, having more than a negligible impact on the affected species or stock.

3.2.2.3 Magnuson-Stevens Fisheries Conservation and Management Act

The MSFCMA calls for direct actions to stop or reverse the continued loss of fish habitats. Toward this end, Congress mandated the identification of habitats essential to managed species and measures to conserve and enhance this habitat. Under the MSFCMA, Congress directs NMFS and the eight regional Fishery Management Council (FMCs) (under the authority of the Secretary of Commerce) to describe and identify EFH in each Fishery Management Plan (FMP); minimize, to the extent practicable, the adverse effects of fishing on EFH; and identify other actions to encourage the conservation of EFH. EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

The MSFCMA requires cooperation among NMFS, the FMCs, fishing participants, and Federal and state agencies to protect, conserve, and enhance EFH. Section 305(b) of the MSFCMA mandates that Federal agencies must consult with the Secretary of Commerce on all proposed activities authorized, funded, or undertaken by the agency that might adversely affect EFH. NMFS recommends consolidated EFH consultations with interagency coordination procedures required by other statutes such as NEPA or the ESA to reduce duplication and improve efficiency (50 CFR 600.920(e)(1)).

3.2.2.4 National Marine Sanctuaries Act

Title III of the NMSA authorizes the Secretary of Commerce to designate and manage discrete marine areas of special national significance as National Marine Sanctuaries (NMSs). The purpose of these sanctuaries is to promote comprehensive long-term management of their conservation, recreational, ecological, historical, research, educational, or aesthetic values. NMSs are built around the existence of distinctive natural and cultural resources whose protection and beneficial use require comprehensive planning and management. Similar to underwater parks, NMSs are managed according to management plans, which are prepared by the NOAA on a site-by-site basis. The NOAA is the Federal agency responsible for administering the NMS Program.

The NMSA prohibits the destruction, loss of, or injury to any sanctuary resource managed under law or regulations for the sanctuary in questions and any violation of the act, any regulations, or permits issued there under (16 U.S.C. 1436). In addition, Section 304(d) of the NMSA (16 U.S.C. 1434(d)) requires Federal agencies to consult with the Secretary of Commerce, through NOAA, on Federal agency actions internal or external to any NMS that are likely to destroy, cause the loss of, or injure any sanctuary resource.

3.2.3 Marine Protected Areas

MPAs, as defined in EO 13158, *Marine Protected Areas*, dated May 26, 2000 (FR 2490), are “any area of the marine environment that has been reserved by Federal, State, territorial, tribal or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein.” The purpose of EO 13158 is to strengthen the management, protection, and conservation of existing MPAs and establish new or expanded MPAs; develop a scientifically based, comprehensive national system of MPAs representing diverse U.S. marine ecosystems, and the Nation’s natural and cultural resources; and avoid causing harm to MPAs through federally conducted, approved, or funded activities. The MPAs within the Project area are shown in **Figure 3.2-1** and also listed below:

- Boca Ciega Bay Aquatic Preserve
- Pinellas County Aquatic Preserve
- Terra Ceia Aquatic Preserve.

Tampa Bay is Florida's largest open-water estuary, covering almost 400 square miles (TBEP 2006). MPAs in the coastal and offshore vicinity of the Tampa Bay estuary include four state-designated and managed APs, three offshore National Wildlife Refuges (NWRs), two Federal Fishery Management Zones (FFMZs), and critical habitat for the Florida manatee and piping plover.

All APs and NWRs are designated as OFWs, per 62-302.700 Florida Administrative Code (F.A.C.). OFWs are defined as waters worthy of special protection because of their natural attributes, as designated by the Environmental Regulation Commission. The designation provides special protection for OFWs and that water designated as special waters and includes a provision that prohibits activities that could cause degradation to water quality.

3.2.3.1 Florida Aquatic Preserves

Pinellas County and Boca Ciega Aquatic Preserves. The Pinellas County AP includes all state-owned submerged lands within the legal boundaries of the county. These submerged lands encompass the western portion of Tampa Bay, all of Boca Ciega Bay, St. Joseph Sound, Clearwater Bay, and offshore waters to the limit of the county, as well as fresh waters such as Lake Tarpon and portions of Lake Seminole. Boca Ciega Bay AP runs along the southwestern coastline of the county and the remainder of the sovereign submerged lands in Pinellas County composes the Pinellas County AP. The Boca Ciega AP (22,000 acres) and Pinellas County AP (336,265 acres) were created by legislative action in 1969 and 1972 respectively. The Boca Ciega Bay area was designated as a preserve to aid in halting the wholesale dredging and filling of the bay, which occurred in conjunction with the finger fill developments of the 1950s. Pinellas County AP was designated to help prevent the Boca Ciega experience from being repeated elsewhere in the county (DE DEM 1987).

Habitats that are encompassed by these two preserves include active scallop beds, reefs, and seagrass beds. Mangroves occur along the fringe of the many of the islands in the preserves. The preserves also include some heavily impacted areas such as the Boca Ciega seawalled finger canals, which were once grass flats and mangrove-lined shores (DE DEM 1987).

Terra Ceia Aquatic Preserve. The Terra Ceia AP is in Manatee County and is comprised of approximately 21,736 acres of submerged lands along the east side of Tampa Bay. The Terra Ceia AP was designated on June 24, 1984, for the primary purpose of preserving the biological resources of the Terra Ceia area marshes and associated waters. The Terra Ceia AP boundary begins just south of the mouth of Little Redfish Creek and ends at Emerson Point on Snead Island. Preserve boundaries extend northwest from these points out to the Intracoastal Waterway or Manatee County line, which then cross and form the outermost corner of the preserve (DNR 1987a).

The Terra Ceia AP consists predominately of fringing mangroves and mangrove islands with some oyster bars, clam beds, and seagrasses. The preserve is important in protecting critical habitat to an extensive array of fish, birds, and other wildlife. Maintaining the continued health of the preserve would involve minimizing water pollution and losses of wetlands resulting from urban, residential, and industrial development in the region (DNR 1987a).

Cockroach Bay Aquatic Preserve. The Cockroach Bay AP was established July 1, 1976, and designated as an OFW on March 1, 1979. Cockroach Bay AP consists of 8,583 acres of submerged land established to preserve the biological resources of the Cockroach Bay area marshes and associated waters. The Cockroach Bay AP boundary begins within the mouth of the Little Manatee River. It then continues in a southwesterly direction along the mean high-water line until it reaches its southern limit at the Hillsborough/Manatee County Line. At its northern border it is bounded by the northern edge of the

Little Manatee River and to the south by the Manatee/Hillsborough County Line and Port Manatee (DNR 1987b).

Cockroach Bay AP consists predominately of fringing mangroves and mangrove islands with some oyster bars, clam beds, and seagrasses. The preserve is important in protecting critical habitat to an extensive array of fish, birds, and other wildlife (DNR 1987b).

3.2.3.2 National Wildlife Refuges

Passage Key NWR. Passage Key NWR is in Manatee County, offshore from the City of St. Petersburg, Florida. Passage Key, at one time a 63-acre wilderness area established in 1905, is one of the first NWRs in the system. When established, it was a mangrove island with a fresh water lake. A 1920 hurricane destroyed the island and today it is a 30-acre meandering barrier island. Passage Key is an important roosting and feeding site for thousands of shore birds and water birds. It provides nesting, feeding, and resting habitat for laughing gulls, royal terns, black skimmers, sandwich terns, brown pelicans, and oyster catchers. The island hosts the largest royal tern and sandwich tern nesting colonies in the State of Florida.

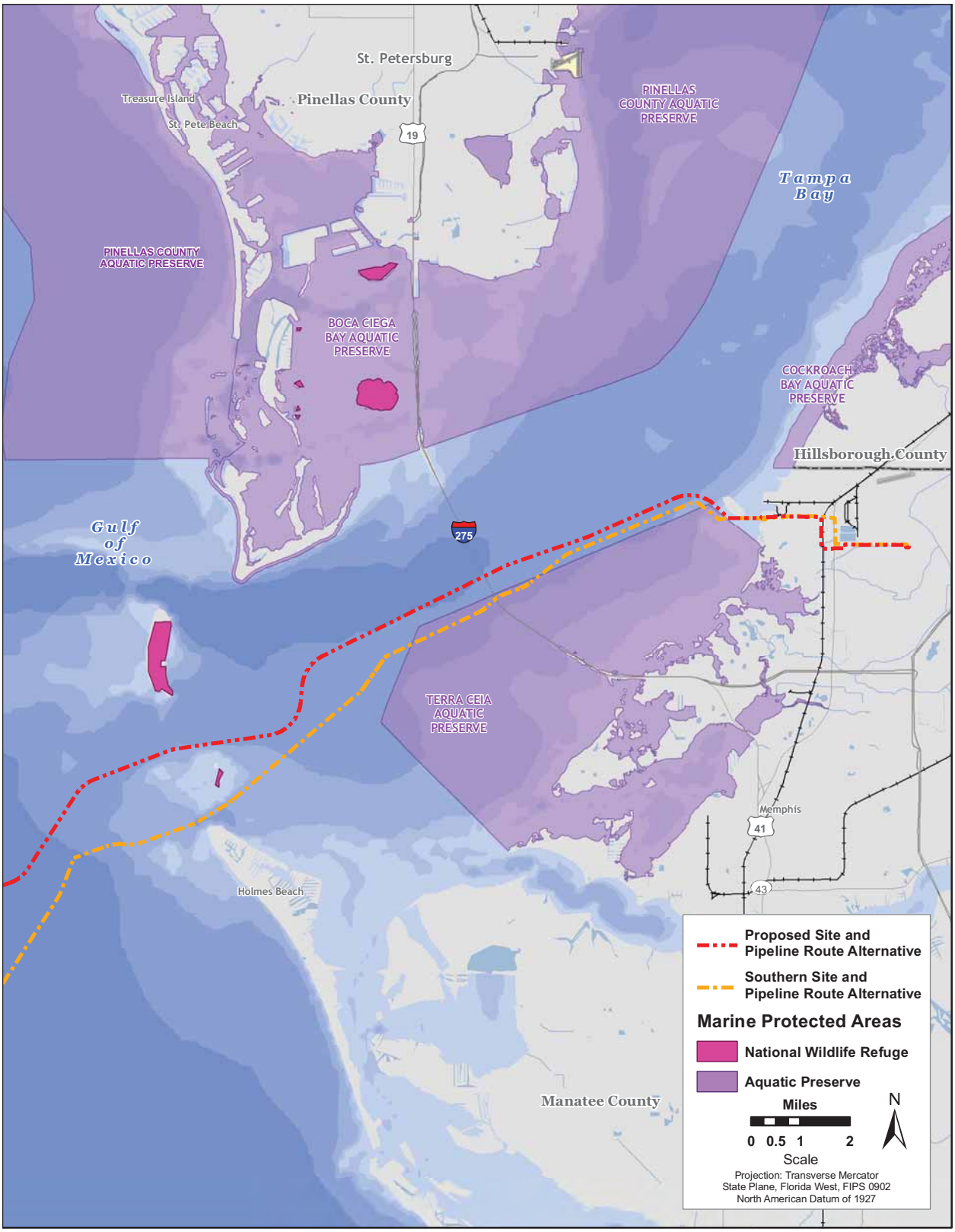
In June 1995, a refuge manager had observed a loggerhead sea turtle nesting on Passage Key NWR. This was apparently the first documented nest on the island, which is only infrequently visited by humans for the purpose of assessing seabird populations (Meylan et al. 2003). The island is accessible only by boat and is currently closed year-round to all public use (USFWS 2007a).

Pinellas NWR. Pinellas NWR is in Pinellas County, offshore from the City of St. Petersburg, Florida. This 394-acre refuge was established in 1951 as a breeding ground for colonial bird species. Pinellas Refuge consists of several islands including Indian, Tarpon, Mule, and Jackass keys. Species nesting on the island include brown pelican, heron, egret, cormorant, and numerous other species. Tarpon Key hosts the largest brown pelican rookery in the State of Florida. The flats surrounding the island are protected from motorized boating activity to protect the lush seagrass beds. The islands are currently closed year-round to all public use because of their small size and critical importance to coastal species (USFWS 2007a).

Egmont Key NWR. Egmont Key NWR is in Hillsborough County, offshore from the City of St. Petersburg, Florida. This 328-acre refuge was established in 1974 to provide nesting, feeding, and resting habitat for colonial nesting water birds, preserve and protect barrier island habitat and historical structures of national significance, provide public opportunities, and provide habitat and protection for endangered species such as manatees and sea turtles. The developed area includes the remnants of historic Fort Dade, a lighthouse and residence currently owned by the USCG, and 5 acres leased by the Tampa Bay Pilots Association. Commercial use on the refuge requires a Special Use Permit (USFWS 2007a).

3.2.3.3 Federal Fishery Management Zones

Reef Fish Stressed Area. The Reef Fish Stressed Area was originally established by the GOM Fishery Management Council (GMFMC) to help rebuild overfished reef fish from the EEZ to the inshore waters in the GOM (see **Figure 3.2-1**) (50 CFR 622.34). The use of fish traps, roller trawls (e.g., rock hopper trawl), and powerheads (e.g., a spear gun shaft with a fire arm ammunition replacing the spearhead) is prohibited in this part of the EEZ in order to reduce fishing pressure on snapper and grouper species. Some of these species were being harvested before they reached optimal harvest size. One of the criteria for delineating the stressed area was the need for special habitat protection. Therefore, the prohibited areas encompass the Florida coral reef tracts and seagrass beds. Additional benefits from this area include habitat conservation and minimization of user conflicts (GMFMC 2004).



Source of Proposed Pipeline: ConShelf 2009. Source of Southern Pipeline: ConShelf 2007. Source of Aquatic Preserves: United States Coast Guard 2007.

Figure 3.2-1. Marine Protected Areas in the Vicinity of the Port Dolphin Project

Reef Fish Longline/Buoy Gear Area Closure. The Reef Fish Longline/Buoy Gear area was established by the GMFMC to protect the larger red snapper spawning population. The use of long lines and buoy gear are prohibited inshore of 20 fathoms in Florida and inshore of 50 fathoms for the remainder of the GOM. This closure reduces the number of undersized red snapper harvested and the potential for gear conflicts between recreational fishermen and longliners (GMFMC 2004).

3.2.3.4 Critical Habitat

Critical habitat is designated under the ESA as "a specific geographic area that is essential for the conservation of a threatened or endangered species and that could require special management or protection." Critical habitat can include an area that is not occupied by a species, but is needed for the recovery of that species.

Critical habitat for the Florida manatee (*Trichechus manatus latirostris*) has been designated in two areas of the Project area: the Little Manatee River downstream from the U.S. Highway 301 bridge in Hillsborough County, and the Manatee River downstream from the Lake Manatee Dam in Manatee County.

Critical habitat for the wintering piping plover occurs along the Florida GOM shorelines. Six units of piping plover critical habitat occur within Pinellas and Hillsborough counties (USFWS 2007a). The closest unit to the Project area is on Egmont Key, Hillsborough County (FL-21). The majority of the unit is within Egmont Key NWR. This unit includes the entire island to mean lower low water (MLLW).

3.2.4 Threatened and Endangered Species

The ESA of 1973 (16 U.S.C. 1531–1534) establishes protection and conservation of threatened and endangered species and the ecosystems upon which they depend. The ESA is administered by the USFWS and NMFS. Under the ESA, an "endangered species" is defined as any species in danger of extinction throughout all or a significant portion of its range. A "threatened species" is defined as any species likely to become an endangered species in the foreseeable future. Section 7 of the ESA requires that all Federal agencies consult with the USFWS or NMFS, as applicable, before initiating any action that could affect a listed species. The Maritime Administration initiated informal consultation with both the USFWS and NMFS on August 24, 2007.

Under the ESA, the Maritime Administration has the responsibility to determine whether or not the Project would adversely affect federally listed threatened or endangered species and their critical habitat (discussed in **Section 3.2.2**). A BA has been prepared to identify the nature and extent of adverse impacts, and recommend measures that would avoid the habitat or species or reduce potential impacts to acceptable levels (see **Appendix E**).

The BA will be used in the interagency consultation as a basis for determining whether the adverse effects are likely to jeopardize any listed species or adversely affect their critical habitats. After consultation, the USFWS or NMFS would issue a BO expressing their opinion about the potential for impacts to occur. If their opinion is that the Project would not likely jeopardize any listed species or their designated critical habitat, they may also issue an incidental take statement as an exception to the prohibitions in the ESA. If, however, the Maritime Administration determines that no federally listed (or proposed) species or their designated critical habitat would be affected by the Project, no further action is necessary.

3.2.4.1 Threatened or Endangered Marine Mammal Species

Introduction

Seven of the marine mammal species occurring in the coastal and offshore vicinity of Tampa Bay are federally listed under the ESA. They include one sirenian and six cetacean species (see **Table 3.2-1**). Of these, only the West Indian manatee is common; rare occurrences of the North Atlantic right whale and the humpback whale are possible in the proposed Project area. The sei whale, blue whale, and fin whale are considered extralimital to the GOM, and though the sperm whale is common in the GOM, it is found only around and seaward of the shelf break in the GOM (Würsig et al. 2000). The additional protection of these species under the MMPA is discussed in **Section 3.2.6.**

Table 3.2-1. Threatened and Endangered Marine Mammals Occurring in the GOM and Tampa Bay Area

Common Name	Scientific Name	Federal ESA Status	Likelihood of Occurrence
Order Sirenia (dugongs, manatees, and sea cows)			
Florida manatee	*Trichechus manatus latirostris*	Endangered	Common inshore, rare offshore
Order Cetacea (whales, dolphins, and porpoises), Suborder Mysticeti (baleen whales)			
North Atlantic right whale	*Eubalaena glacialis*	Endangered	rare
Humpback whale	*Megaptera novaeangliae*	Endangered	rare
Sei whale	*Balaenoptera borealis*	Endangered	Not expected
Blue whale	*Balaenoptera musculus*	Endangered	Not expected
Fin whale	*Balaenoptera physalus*	Endangered	Not expected
Order Cetacea, Suborder Odontoceti (toothed whales)			
Sperm whale	*Physeter macrocephalus*	Endangered	Not expected

Marine Mammal Hearing

When considering the influence of various kinds of noise on the marine environment, it is necessary to understand that different kinds of marine life are sensitive to different frequencies of sound. Information on hearing in marine mammals is based on the frequencies of sounds produced, behavioral observations, anatomical evidence, and extrapolations from what is known about other marine mammal hearing. Marine mammal hearing varies among species; however, as a group, marine mammal hearing ranges are generally from 0.01 to 200 kHz. Broad generalizations can be made about groups of marine mammals. For example, most toothed whales (odontocetes) hear well in ultrasonic ranges, with functional hearing from 0.15 kHz to 180 kHz. Some toothed whales are able to hear frequencies as high as 200 kHz (NRC 2003). Southall et al. (2007) delineated three groups of cetaceans based on similarities in their hearing: Low-frequency cetaceans (0.007 Hz to 22 kHz), Mid-frequency cetaceans (150 Hz to 160 kHz), High-frequency cetaceans (0.2 kHz to 180 kHz).

Data on the hearing abilities of cetaceans are sparse, particularly for the larger cetaceans such as the baleen whales. The auditory thresholds of some of the smaller odontocetes have been determined in captivity (Ljungblad et al. 1982, Thomas et al. 1988, Houser et al. 2008). It is generally believed that cetaceans should at least be sensitive to the frequencies of their vocalizations. Comparisons of the

anatomy of cetacean inner ears and models of the structural properties and the response to vibrations of the ear's components in different species provide an indication of likely sensitivity to various sound frequencies. The ears of small-toothed whales are structurally optimized for receiving high-frequency sound, while baleen whale inner ears are best optimized for low to infrasonic frequencies (Ketten 1992, 1997). As such, baleen whales are considered to be low-frequency cetaceans (Southall et al. 2007).

The other two species of endangered marine mammals (i.e., North Atlantic right whales and manatees) likely hear in the low frequencies based on similarities to other baleen whale species and studies looking to the auditory thresholds of manatees. Ketten et al. (1992) felt that, based on the ear morphology and studies on other manatee subspecies (Klishin et al, 1990, Popov and Supin 1990) manatees likely hear best in the lower frequencies (1 kHz to 5 kHz) and are not likely to hear above 20 kHz. The only available behavioral audiogram for a sirenian is from the West Indian manatee, where peak sensitivity of hearing was between 16 and 18 kHz with functional hearing limits between 400 Hz and 46 kHz (Gerstein et al. 1999, Gerstein 2002). For information regarding marine mammal reactions to noise, including the Proposed Action, refer to Chapter 4.

Florida Manatee. Florida manatees are a subspecies of the endangered West Indian manatee and inhabit coastal marine, brackish, and fresh water habitats from Virginia to Brazil and are exclusively herbivorous, feeding on both submergent and emergent aquatic vegetation (Würsig et al. 2000). Surveys conducted by the Florida Fish and Wildlife Research Institute counted approximately 1,405 manatees in the waters off eastern Florida (FWRI 2007a). The Southwest management unit, which inhabits all areas between the Pasco-Hernando County line southward to Whitewater Bay in Monroe County, has declined at an estimated rate of 1.1 percent per year over the 8-year period prior to 2002 (Runge et al. 2004, 2007). Estimates of adult survival are lower than those of all other subpopulations, probably due to the combined effects of watercraft mortality and episodic mortality events.

Sightings of manatees tend to be restricted to warm fresh water, estuarine, and extremely nearshore coastal waters. Manatees occur in very shallow waters of 2 to 4 m depth (7 to 13 feet), generally close to shore (< 1 km) and in close proximity to seagrass beds (Lewis et al. 1984, Zoodsma 1991). Historically, the winter range of the Florida manatee was thought to focus on south Florida, with some animals ranging north of Charlotte Harbor on Florida's west coast and north of Sebastian on Florida's east coast (USFWS 2007). In summer, they inhabit estuaries and coastal bays, but in winter they migrate to warmer waters, or seek warmwater refugia, with appropriate food sources (Gannon et al. 2007, Laist and Reynolds 2005). During the cold months, manatees frequently aggregate at warmwater discharges of powerplants and at natural warmwater springs during the passage of cold fronts because they cannot tolerate water temperatures less that 20 °C (68 °F) (Irvine 1983, Laist and Reynolds 2005). During warm interludes, manatees leave these areas to feed on nearby seagrass beds (Hartman 1979, Stith et al. 2006).

During the winter months most manatees in Tampa Bay are typically found around the TECO Big Bend power plant discharge at Apollo Beach and the Florida Power Corporation's Bartow power plant discharge in St. Petersburg (Frisch et al. 2003). The number of manatees using Tampa Bay has steadily increased in the past decade, likely as a result of improved habitat and the presence of power plants that provide warmwater refuges for manatees wintering in the bay. More than 350 individuals have been counted in the bay in the winter months. About 150 animals are found in the bay in the summer, when the entire West Coast population is more scattered (TBEP 2006).

Vessel strikes can contribute to more than 30 percent of the documented annual mortalities of manatees (Ackerman et al. 1995). From 1998 through 2001, watercraft collisions attributed to 89 manatee deaths (approximately 26 percent) in Hillsborough, Manatee, and Pinellas counties (Frisch et al. 2003). During the period 2000 through 2006, 58 manatee deaths in Hillsborough, Manatee, and Pinellas counties were attributed to watercraft collisions (27, 14, and 17, respectively) (FWC MMPL 2007). In 2006, nearly one

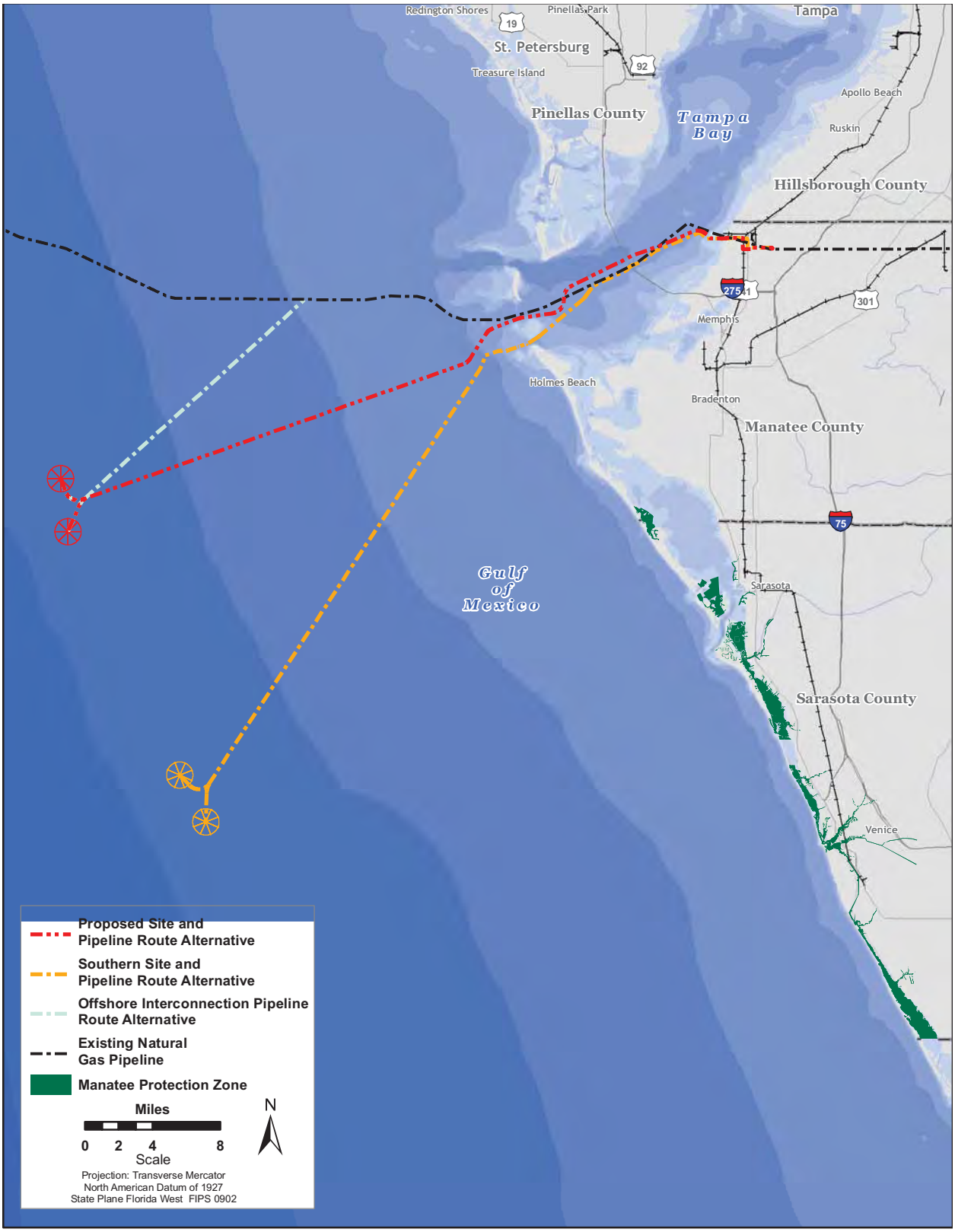
manatee per month was killed by watercraft in the three Tampa Bay counties (FWC MMPL 2007). However, these reported deaths do not take into account the latent impacts on feeding, mating, or birthing that are a direct result of a boat strike (Nowacek et al. 2004).

In addition to the critical habitat areas discussed in **Section 3.2.3**, a number of manatee protection areas have been created in the Tampa Bay region. Several year-round slow-speed zones have been created through state or local regulations, and two no-entry areas have been created around the power plant outfalls at Tampa Electric's Big Bend complex and the Bartow plant at Weedon Island. In addition, extensive shoreline speed zones are in place in Hillsborough County from Tampa's Rocky Point area south to the Gandy Bridge, from the Alafia River to E.G. Simmons Park south of Ruskin, in Terra Ceia Bay, the Manatee River, and in Pinellas County north of the Courtney Campbell Causeway to Oldsmar. Finally, Pinellas County has implemented seagrass protection zones at Fort DeSoto Park, Weedon Island, and north of the Courtney Campbell Causeway that also serve to protect manatees feeding and resting in the shallow grass beds (TBEP 2006). Manatee protection zones within the Tampa Bay area are illustrated in **Figure 3.2-2**.

North Atlantic Right Whale. The North Atlantic right whale is the most endangered large whale species in the world (Perry et al. 1999; IWC 2001a, 2001b; NMFS 2005) with between 350 and 400 known individuals left in the western North Atlantic population (Kraus et al. 2005, Waring et al. 2008). North Atlantic right whales feed on zooplankton and tend to prefer large calanoid copepods such as *Calanus sp*. (Kenney et al. 1985, Beardsley et al. 1996). Typical feeding grounds for right whales are areas where bottom topography, water column structure, currents, and tides combine to physically concentrate zooplankton into extremely dense patches. The majority of the North Atlantic right whale population leaves the feeding grounds for unknown habitats in the winter but returns to the feeding grounds coinciding with the return of cow-calf pairs (Waring et al. 2008). North Atlantic right whales are typically found in Cape Cod Bay in February through April; in Canadian feeding grounds from June through November; and in coastal waters off North Carolina, Georgia, and Florida from November through March (Waring et al. 2008).

North Atlantic right whales are most often sighted in nearshore and continental shelf waters between Florida and Nova Scotia. Right whales on the winter calving grounds are most often found in very shallow nearshore waters, in cooler temperatures inshore of a mid-shelf front (Kraus et al. 1993, Ward 1999). Most sightings of right whales have occurred within five high-use areas: the coastal waters of the southeastern United States (Georgia and Florida), Cape Cod and Massachusetts Bays, the Great South Channel, the Bay of Fundy, and the Nova Scotian Shelf (Winn et al. 1986, NMFS 2005). Calving occurs from December through March (NMFS 2005). Based on these areas of high occurrence, critical habitat has been designated for feeding grounds off Cape Cod and calving grounds off the Atlantic coast of Florida and Georgia (59 FR 28805). However, there are also rare occurrences in the GOM and nearshore sightings have included individual whale as well as mother-calf pairs (Moore and Clark 1963, Layne 1965, Smith and Windham-Reid 2004, NOAA and FWC 2006, Zoodsma 2006). These records likely represent extralimital strays from the wintering grounds or might even reflect a more extensive historic range beyond the known calving and wintering ground in the waters of the southeastern United States (Jefferson and Schiro 1997, Waring et al. 2008).

Humpback Whale. Humpback whales are not usually encountered in the GOM (Weller et al. 1996). In the North Atlantic Ocean, humpbacks are found from spring through fall on feeding grounds that are located from south of New England to northern Norway (NMFS 1991). The Gulf of Maine is one of the principal summer feeding grounds for humpback whales in the North Atlantic. The largest numbers of humpback whales are present from mid-April to mid-November. During the winter, most of the North Atlantic population of humpback whales is believed to migrate south to calving grounds in the



Source of Manatee Protection Zone: United States Coast Guard 2007.

Figure 3.2-2. Manatee Protected Areas in the Vicinity of the Port Dolphin Project

West Indies region (Smith et al. 1999, Stevick et al. 2003). Not all of the stock migrates to the West Indies every winter; since significant numbers of animals are found in mid- and high-latitude regions during the winter months (Waring et al. 2008). In recent years, there have been a number of wintertime humpback sightings in coastal waters of the southeastern United States including the GOM (Weller et al. 1996, Waring et al. 2008). Humpbacks occurring in the GOM are likely juveniles that have wandered here from the nearby Caribbean Sea and Atlantic Ocean during the breeding season or on their migration northward (Weller et al. 1996, Jefferson and Schiro 1997), although a review of the available records suggests that such occurrences could actually occur during any time of the year.

Humpback whales feed on a wide variety of invertebrates and small schooling fish. The most common invertebrate prey are euphausiids (krill); the most common fish prey are herring, mackerel, sand lance, sardines, anchovies, and capelin (*Mallotus villosus*) (Clapham and Mead 1999).

Humpback whales are classified as endangered under the ESA (NMFS 1991) and, therefore, are considered to be a strategic stock (Waring et al. 2008). The NOAA Stock Assessment Report states that the best estimate of abundance for the Gulf of Maine stock of humpback whales is 847 individuals (Waring et al. 2008). There is no critical habitat designated for the humpback whale.

3.2.4.2 Threatened and Endangered Sea Turtles

Worldwide, there are seven species of sea turtles in two distinct families, the Cheloniidae (i.e., hard-shelled sea turtles, six species) and the Dermochelyidae (i.e., leatherback sea turtle, one species). Of those seven species, six are found in U.S. waters: the green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), and olive ridley (*Lepidochelys olivacea*). All six species found in U.S. waters are currently listed as either threatened or endangered under the ESA. **Table 3.2-2** outlines the turtle species that can be found in the vicinity of the Project and their status. Four of the six species of sea turtles (i.e, loggerhead, green turtle, Kemp's ridley, and hawksbill) occur in the Tampa Bay area. Loggerhead sea turtles are by far the most numerous in this area, but green, hawksbill, and Kemp's ridley turtles also are found (Meylan et al. 2003). Although there are currently no records for olive ridleys in the Tampa Bay area, extralimital occurrences are documented for the Florida Keys.

In the GOM, the number of turtle sightings is highest in continental shelf waters in summer and fall but sightings occur in the shelf and deeper waters throughout the study area in winter and spring (McDaniel et al. 2000). Reports by Lohoefener et al. (1990), Davis et al. (2000), McDaniel et al. (2000), and Mullin and Davis (2001) indicate that sea turtles are far more abundant in GOM waters east of the mouth of the Mississippi River than in waters to the west. Coastal waters of the GOM also serve as developmental habitat for juvenile Kemp's ridleys (Musick and Limpus 1997). Loggerhead sea turtles are the most abundant sea turtle in Florida and the GOM (FWRI 2006, USFWS and NMFS 2008). Leatherbacks are the most abundant along the northern GOM continental slope (Viada 2000). The hawksbill turtle occurs along all of the Gulf states and along the eastern seaboard as far north as Massachusetts, but sightings north of Florida are rare. Although hawksbill sea turtles are the least common sea turtle in the GOM, they have been recorded in waters of all of the states along the GOM (USFWS and NMFS 1993).

Sea turtle life history stages include eggs, hatchling, juvenile, and adult (MMS 2002a). In general, sea turtles nest along the entire GOM coastline. In the Project area, hatchling sea turtles move offshore in a swimming frenzy, immediately after hatching. Post-frenzy hatchling sea turtles move to areas of convergence or to sargassum mats and undergo passive oceanic migrations (Wyneken 2001). Juvenile sea turtles actively recruit to nearshore nursery habitat and move into adult foraging habitat when approaching sexual maturity.

Table 3.2-2. Sea Turtle Occurrence in the Tampa Bay Region

Species	ESA Status	Typical Adult Habitat	Juvenile/Hatchlings Potentially Present?
Family Cheloniidae			
Green sea turtle (*Chelonia mydas*)	T, E*	Shallow coastal waters; seagrass beds	Yes
Hawksbill sea turtle *(Eretmochelys imbricata)*	E	Shallow coastal waters; coral reefs	Yes
Kemp's ridley sea turtle (*Lepidochelys kempi*)	E	Shallow coastal waters; seagrass beds	Yes
Loggerhead sea turtle (*Caretta caretta*)	T	Estuarine, coastal, and shelf waters	Yes
Olive ridley sea turtle (*Lepidochelys olivacea*)	T, E*	Coastal, shelf, and slope waters	Yes
Family Dermochelyidae			
Leatherback sea turtle (*Dermochelys coriacea*)	E	Coastal, shelf, and slope waters	Yes

Source: Meylan et al. 2003

Notes:

E – Federally listed as "endangered" under the ESA of 1973.

T – Federally listed as "threatened" under the ESA of 1973.

* = Although the species as a whole is listed as threatened, the Florida and Mexican Pacific nesting stocks of the green turtle and the Mexican Pacific nesting stocks of the olive ridley turtle are listed as endangered. Since the nesting areas for green and olive ridley turtles encountered at sea often cannot be determined, a conservative approach to management requires the assumption that all greens and olive ridleys found in the study area are endangered.

At the onset of nesting, adults move between foraging habitats and nesting beaches. Mating habitat depends on species and might occur off nesting beaches or remotely. Females reside near nesting beaches during nesting season (MMS 2002a). Recent research has revealed that Tampa Bay is an important nursery area for young Kemp's ridley sea turtles (TBEP 2006). The bay serves as habitat for several life history stages of sea turtles, including foraging adults, foraging juveniles and subadults, and nesting females. The GOM waters adjacent to Anna Maria Island, Egmont Key, and all of Pinellas County can be expected to be visited by both reproductive males and females during the mating and nesting season (Meylan et al. 2003).

Loggerheads, greens, and leatherbacks nest regularly on Florida's beaches (Meylan et al. 1995, 2006). Approximately 350 sea turtles nest annually on beaches surrounding Tampa Bay (TBEP 2006). Nearly all ocean-facing (Gulf) sandy beaches in the Tampa Bay area are used as nesting habitat by sea turtles.

Surveys conducted by the FMRI recorded sightings of marine turtles in all sectors of Tampa Bay, with higher densities in the southern part of the bay, particularly in the area around Terra Ceia, just south of the Sunshine Skyway Bridge (Meylan et al. 2003). Based on stranding records, aerial surveys, and incidental captures, the occurrence of sea turtles in the Tampa Bay area suggests that turtles are common inhabitants of the bay. Their great mobility and tendency to remain submerged most of the time contribute to their inconspicuous nature. The following species were observed during the surveys (in decreasing order of abundance): loggerheads, Kemp's ridleys, greens, and hawksbills.

Strandings of dead or injured marine turtles along Florida's coastline are monitored by FMRI as part of the Sea Turtle Stranding and Salvage Network (STSSN). A total of 298 records of dead or injured turtles

exist for the inshore waters of the Tampa Bay area for 1980 through 2001. Loggerhead turtles are by far the species most frequently documented. Strandings of loggerheads were most numerous from March through June, with a smaller peak in October and November. Green turtle strandings were documented primarily outside the summer months, with a peak in February and March. Strandings of Kemp's ridleys have occurred in all months, with no obvious seasonal pattern. Dead or injured loggerheads and Kemp's ridleys have been recovered in all sectors of the bay; green turtle strandings have been far more restricted in distribution, with most occurring near the mouth of the bay. All hawksbill strandings have been in the outer bay area (Meylan et al. 2003).

Although they are all now protected by law from harvesting, it is clear from stranding records that numerous mortality factors are still operating. Many are human-related, such as boat collisions, entanglement, and incidental catch. Boat-related injuries (including propeller wounds and possible boat collision injuries), were the most frequently observed carcass anomaly for loggerheads; 16 Kemp's ridleys and 1 hawksbill also showed evidence of boat injuries. Seven cases of entanglement were reported, affecting all species (Meylan et al. 2003).

In 2004, sea turtle strandings in the Tampa Bay region accounted for 13.5 percent of the total offshore strandings and 14.7 percent of the inshore strandings in the entire GOM (see **Table 3.2-3**). A total of 107 sea turtle strandings were verified in the offshore and inshore areas of Tampa Bay, with loggerhead strandings accounting for 70 percent of the total.

Table 3.2-3. Offshore and Inshore Sea Turtle Strandings in Tampa Bay and the Entire GOM Region in 2004

Sea Turtles	Offshore		Inshore	
	Tampa Bay	GOM	Tampa Bay	GOM
Green	13	89	9	103
Hawksbill	1	20	0	1
Kemp's ridley	5	94	3	26
Leatherback	1	13	0	2
Loggerhead	55	322	20	77
Olive ridley*				
Unknown	0	19	0	8
Total	75	557	32	217

Source: STSSN 2004

Note:

The Tampa Bay area was characterized by the "zone 5" designation on the STSSN zone map.

*There are no records of this species in the area, only extralimital occurrences are recorded in Florida keys

There are no designated critical habitats or migratory routes for sea turtles in the GOM. However, NMFS recognizes many coastal areas as preferred habitat (i.e., important habitats for the species within a specific geographic area) for sea turtles. For example, nearshore or inshore areas are preferred habitat for green sea turtles, while bays are preferred habitat for Kemp's ridley sea turtles (MMS 2002a). Sargassum mats are also recognized as preferred habitat for juvenile sea turtles.

Green Sea Turtle. Green sea turtles are found throughout the GOM, where they inhabit shallow waters (except when migrating) inside reefs, bays, and inlets and tend to be found in areas with marine grass and

algae (USFWS 2002c). Green turtles nest on both island and continental beaches between 30ºN and 30ºS latitudes (Witherington et al. 2006). Early life stages are spent in open ocean pelagic habitats (bottom depths > 200 m), feeding primarily on planktonic animals (Musick and Limpus 1997). After several years of the early developmental stage, greens leave oceanic/pelagic habitats and recruit to neritic/benthic habitats (bottom depth < 200 m) also known as developmental areas, (where they forage on seagrasses and algae (Musick and Limpus 1997). During maturation, juveniles might pass through multiple developmental habitats in coastal waters (Witherington et al. 2006). Sexually mature turtles migrate between foraging areas and nesting areas every few years (Hirth 1997). Green turtles nest in Florida from June to late September on Florida's east coast. Nesting has been reported on Anna Maria Island (2002) and Longboat Key North (2003) in Manatee County and Fort DeSoto County Park (1994) and north Pinellas County Beaches (2000) in Pinellas County (FMRI 2006).

It is expected that green sea turtles would occur within offshore and nearshore waters of the Project area. The green sea turtle is currently listed as a threatened species internationally and as an endangered species in Florida. No critical habitat has been designated in the GOM.

Hawksbill Sea Turtle. The hawksbill turtle has a circumglobal distribution in tropical, and to a lesser extent, subtropical seas of the Atlantic, Pacific, and Indian oceans (MTSG 2007a). Early juveniles occur in open ocean habitats in sargassum or flotsam lines (Meylan and Redlow 2006). They recruit into a neritic developmental foraging habitat that can compose coral reefs or other hard-bottom habitats, sea-grass, algal beds, or mangrove bays and creeks (Musick and Limpus 1997). As they increase in size, immature hawksbills typically inhabit a series of developmental habitats, with some tendency for larger turtles to inhabit deeper sites (van Dam and Diez 1997, Bowen et al. 2007). Hawksbills use caves, crevices, and ledges for resting (Meylan and Redlow 2006). Coral reefs and hard-bottom areas are generally recognized as the resident foraging habitat for juveniles and adults (Meylan and Redlow 2006). Adult hawksbills feed on encrusting organisms such as sponges, tunicates, bryozoans, algae, mollusks, and a variety of other items such as crustaceans and jellyfish (Bjorndal 1997). Older juveniles and adults are more specialized and feed primarily on sponges. Sponges compose as much as 95 percent of their diet in some locations (Witzell 1983, Meylan 1988).

Nesting within the continental United States is limited to southeastern Florida and the Florida Keys (Viada 2000). Nesting on GOM beaches is extremely rare (NMFS 2002). One hawksbill nest was found on Longboat Key, in Manatee County, in 1980 (FMRI 2006). In most locations, nesting occurs between April and November, but varies depending on the area. Hawksbill nesting within the continental United States is limited to southeastern Florida and the Florida Keys.

The global population of hawksbill sea turtles has declined 80 percent over the past 100 years, with only approximately 15,000 females nesting worldwide (USFWS 2002b). It is expected that hawksbill turtles would occur within nearshore waters of the Project area. The hawksbill is listed as endangered. No critical habitat has been designated in the GOM.

Kemp's Ridley Sea Turtle. The Kemp's ridley is restricted to the North Atlantic (Márquez 1994). Adults are largely confined to the GOM, with moderate numbers along the U.S. Atlantic Coast as far north as Nova Scotia (Lazell 1980, Morreale et al. 1992). Offshore water temperatures play a major role in determining the number of Kemp's ridleys present in the North Atlantic Ocean. During the winter, Kemp's ridleys migrate to warmer waters and then return to their former habitat or bury themselves in mud bottoms to avoid low temperatures (Márquez 1994). Seasonal coastal migration occasionally brings them to overwinter in central to south Florida. Although Kemp's ridleys can be observed in Florida waters year-round, the highest abundances have been documented during December through March (Henwood and Ogren 1987). Kemp's ridley turtles overwintering in Florida waters can be expected to move north as water temperatures increase, foraging along the way, and return south to Florida in the fall

when temperatures cool. These seasonal movements may continue until turtles reach sexual maturity, at which time, turtles may return to breeding grounds in the GOM (Henwood and Ogren 1987). Kemp's ridley turtles feed primarily on portunids and other types of crabs but are also known to prey on mollusks, shrimp, fish, and plant material (Márquez 1994, Schmid and Barichivich 2006).

Kemp's ridleys travel near the coast and are considered relatively common within all sectors of Tampa Bay (Meylan et al. 2003). Stranding and capture records indicate that Kemp's ridleys were most often encountered in west Florida in the late spring and summer. This temporal pattern is likely due to migration or winter dormancy (Mahmoudi et al. 2002).

Nesting occurs primarily on a single nesting beach at Rancho Nuevo, Tamaulipas, Mexico (USFWS and NMFS 1992b), with a few additional nests in Texas, Florida, and the Carolinas (Schmid and Barichivich 2006). Nesting occurs from April into July (NMFS 2002a). Kemp's ridley nests were recorded within Pinellas County on Madeira Beach in 1989 (Meylan et al. 2003), 1994, and twice in 2002 (FMRI 2006).

It is expected that Kemp's ridley turtles would occur within offshore, nearshore, and coastal waters of the Project area. The Kemp's ridley is currently listed as an endangered species and is considered the most endangered sea turtle in the world (USFWS and NMFS 1992b). No critical habitat has been designated in the GOM.

Leatherback Sea Turtle. Leatherback sea turtles are the most abundant sea turtle on the northern GOM continental slope (Viada 2000). They are the largest, deepest diving, most migratory, widest ranging, and most pelagic sea turtle (USFWS 2002a). There is limited information available regarding the habitats utilized by early juvenile leatherbacks because this age class is entirely oceanic. However, scientists are relatively certain that these individuals do not associate with floating debris or vegetation (USFWS and NMFS 1992a). Late juvenile and adult leatherback turtles are known to range from mid-ocean to the continental shelf and nearshore waters (Schroeder and Thompson 1987, Shoop and Kenney 1992, Grant and Ferrell 1993, Starbird et al. 1993). Hatchlings and smaller-sized juveniles are limited to tropical waters, where temperatures are above 26 °C (Eckert 2002). Juvenile and adult foraging habitats include both coastal feeding areas in temperate waters and offshore feeding areas in tropical waters (Frazier 2001). Leatherbacks are highly migratory and can be found within convergence zones and upwelling areas in the open ocean, along continental margins, and in archipelagic waters (Morreale et al. 1996, Shoop and Kenney 1992). Leatherback sea turtles tend to stay in temperate waters to forage, with only the females returning to tropical beaches to lay eggs (USFWS and NMFS 1992a). The diet of the leatherback sea turtle generally consists of gelatinous zooplankton such as cnidarians (e.g., jellyfish and siphonophores) and tunicates (e.g., salps and pyrosomas) in the pelagic environment (Bjorndal 1997, James and Herman 2001, Stewart and Johnson 2006).

The leatherback has a wide nesting distribution in the tropical Pacific and Atlantic, especially on mainland shores, but with a somewhat widespread island nesting in the Antilles (TEWG 2007). Global abundance estimates of breeding female leatherbacks range from 70,000 to 115,000, and the number of nests reported in Florida ranges from 39 to 188 since 1979. Leatherbacks nest in Florida from April through July, but they are observed along Florida's west coast during all months except February and April. Sightings in southwestern Florida have been concentrated between 27 and 166 km from shore (Mahmoudi et al. 2002).

It is likely that leatherback sea turtles would occur within offshore waters of the Project area. Leatherbacks are listed as endangered but no critical habitat has been designated in the GOM.

Loggerhead Sea Turtle. Loggerhead sea turtles occur in subtropical and temperate regions of the Atlantic, Pacific, and Indian oceans (Dodd 1988). Although the major nesting concentrations in the

United States are found in South Florida, loggerheads nest from Texas to Virginia. The loggerhead turtle occurs worldwide in habitats ranging from coastal estuaries to waters far beyond the continental shelf (Dodd 1988). Long-term in-water studies indicate that late juvenile loggerheads reside in particular developmental foraging areas for many years (USFWS and NMFS 2008). Loggerheads often associate with natural and artificial hard substrates (e.g., live hard bottom, artificial reefs, shipwrecks), which provide an abundance of prey, as well as sheltered locations where they can rest (Dodd 1988, Makowski et al. 2006). Seasonal movements of juvenile loggerheads along the Atlantic coast, from more northerly resident areas during warmer months to more southerly or offshore resident areas during colder months, have been well-documented (USFWS and NMFS 2008). Results from satellite telemetry have demonstrated that a small proportion of the juvenile stage could return to the oceanic zone particularly in the winter (Mansfield 2006). Loggerhead turtle diet changes with age and size of the individual. The gut contents of post-hatchlings found in masses of sargassum contained parts of sargassum, zooplankton, jellyfish, larval shrimp and crabs, and gastropods (Richardson and McGillivary 1991). Juvenile and subadult loggerhead turtles are omnivorous, foraging on pelagic crabs, mollusks, jellyfish, and vegetation captured at or near the surface (Dodd 1988). Adults are generalized carnivores that forage on nearshore benthic invertebrates (Dodd 1988).

About 14,000 female loggerheads nest in the southeastern United States annually, and this species accounts for approximately 98 percent of the total sea turtle nesting activity in Florida. In 2006, 377 loggerhead nests were found in Manatee, Hillsborough, and Pinellas counties (191, 21, and 165, respectively) (FMRI 2006). Nests are documented annually on the barrier islands off Pinellas and Manatee counties, with Egmont Key providing the most pristine nesting beach remaining (an average of 44 loggerhead nests has been documented on the key annually from 1989 through 2001 (Meylan et al. 2003). Florida's west coast is also a major feeding area for nonnesting loggerheads. Nesting females remain in shallow areas near beaches during the nesting season. They then disperse to feeding grounds throughout the Bahamas, Cuba, Dominican Republic, north along the eastern U.S. coast and south through the Florida Keys and GOM (late April to September).

It is expected that loggerhead sea turtles would occur within offshore, nearshore, and coastal waters of the Project area. The loggerhead is currently listed as a threatened species.

Olive Ridley Sea Turtle. The olive ridley sea turtle has a circumtropical distribution, with nesting occurring throughout tropical waters (MTSG 2007b). Olive ridleys do not nest on U.S. beaches (USFWS and NMFS 2007). Shallow benthic waters also serve as foraging grounds for olive ridleys (Bjorndal 1997). An olive ridley satellite tagged and released off Andros in the Bahamas exhibited preferences for shallow areas (< 200 m) near the coast of western Andros and homogenous habitat (Bolten and Bjorndal 2006). Olive ridley turtles are omnivorous; identified prey include a variety of benthic and pelagic prey items such as shrimp, jellyfish, crabs, snails, and fish, as well as algae and seagrass (Reichart 1993, Bjorndal 1997, USFWS and NMFS 1998, Polovina et al. 2004). Crustaceans and fish serve as their primary food source.

Although there are currently no records for olive ridleys in the Tampa Bay area, extralimital occurrences are documented for the Florida Keys.

Sea Turtle Hearing. Sea turtle hearing sensitivity, in air and underwater, is not well-studied. Sea turtles do not have an external ear; rather the tympanum is a continuation of the facial tissue (Bartol and Musick 2003). Reception of sound is also through bone conduction, with the skull and shell acting as receiving structures (Lenhardt et al. 1983). Sea turtles appear to hear best in the lower-frequencies (< 1 kilohertz [kHz]) (Bartol and Ketten 2006). The effective dynamic hearing range for sea turtles is probably between 0.1 to 1 kHz (Ridgway et al. 1969; Lenhardt 1994; Bartol et al. 1994, 1999). Also, calculated in-water hearing thresholds appear to be high (160 to 200 dB re 1 μPa) (Lenhardt 1994). Research based on brain

physiology indicates that sea turtles are able to hear sounds with frequencies ranging from 0.08 to 2 kHz, with maximum sensitivity levels reported between 0.1 and 0.8 kHz and 0.3 and 0.4 kHz (Lenhardt 1994, NRC 2003). Bartol et al. (1999) reported that juvenile loggerhead turtles hear sounds between 250 (lowest frequency that could be tested due to equipment) and 1,000 hertz (Hz) (most sensitive at 250 Hz) using the auditory brainstem response (ABR) technique (that is, evoking an electrical signal in the brainstem by the presentation of a sound). Lenhardt (2002) found that adults can hear sounds from 30 Hz to 1 kHz (most sensitive at 0.4 to 0.5 kHz) using startle response (i.e., contract neck or dive) and ABR techniques. Loggerhead sea turtle hearing ranges from 0.25 to 0.75 kHz with peak sensitivity at 0.25 kHz (Richardson et al. 1995). ABR data analyzed in Bartol and Ketten (2006) found that subadult green turtles detect frequencies between 100 and 800 Hz and that their most sensitive hearing was between 0.2 and 0.7 kHz. Bartol and Ketten (2006) also found that two juvenile Kemp's ridley turtles had a more restricted range of between 100 and 500 Hz with their most sensitive hearing between 0.1 and 0.2 kHz (Bartol and Ketten 2006).

While sea turtles do not appear to be sensitive to the frequency ranges associated with the Proposed Action, they do show effects to lower frequencies. Lenhardt (2002) found that at received levels from 151 to 161 dB re 1 μPa, adult loggerheads showed a marked response (i.e., increased swimming speeds) and avoided areas where low frequency air guns were being used at up to 175 dB re 1 μPa. However, they eventually habituated to these received levels. During the same trials, one turtle exhibited temporary threshold shift (TTS) of more than 15 dB for up to 2 weeks after exposure to these received levels (Lenhardt 2002). Juveniles also have been found to avoid low-frequency sound (less than 1 kHz) produced by airguns (O'Hara and Wilcox 1990). In a separate study, green and loggerhead sea turtles exposed to seismic air guns began to noticeably increase their swimming speed, as well as swimming direction, when received levels reached 155 dB re 1 $\mu Pa^{2-}s$ for green turtles and 166 dB re 1 μPa^{2}-s for loggerhead turtles (McCauley et al. 2000). In terms of sound production, nesting leatherback turtles have been recorded producing sounds (sighs or belch-like sounds) up to 1.2 kHz with most energy ranging from 0.3 to 0.5 kHz (Mrosovsky 1972, Cook and Forrest 2005).

3.2.4.3 Threatened and Endangered Bird Species

The USFWS is responsible for coastal and marine bird protection and recovery under the authority of the ESA. The threatened and endangered birds that occur in the northern GOM and inhabit or frequent coastal areas and waters of the inner continental shelf include the piping plover (*Charadrius melodus*) and wood stork (*Mycteria americana*).

Piping Plover. Piping plovers are migrant shorebirds that overwinter along the southeastern U.S. and GOM coasts. Piping plovers from all three breeding populations winter along South Atlantic, Gulf Coast, and Caribbean beaches and barrier islands, primarily on intertidal beaches with sand or mud flats with no or very sparse vegetation. Plovers depart for the wintering grounds from mid-July through late October. Breeding and wintering plovers feed on exposed wet sand in wash zones; intertidal ocean beach; wrack lines; washover passes; mud-, sand-, and algal flats; and shorelines of streams, ephemeral ponds, lagoons, and salt marshes by probing for invertebrates at or just below the surface. They use beaches adjacent to foraging areas for roosting and preening (USFWS 2007b). Christmas Bird Count (CBC) census surveys during the 2006 to 2007 season recorded only three individuals within the St. Petersburg survey area, and none within the Alafia Banks Sanctuary, the Tampa survey area, and the Bradenton survey area (Audubon Society 2007). As discussed in **Section 3.2.3**, critical habitat has been designated for the piping plover.

Wood Stork. Wood storks are the only storks that regularly inhabit North America. These wading birds are year-round residents of Florida and Georgia, though sightings occur within the other Gulf coastal states. Wood storks frequent fresh water and brackish coastal wetland habitats. This endangered species nests at a single site in Tampa Bay, the Dot-Dash colony at the mouth of the Braden River. During the

1994 through 2001 census, numbers varied from about 40 to 160 pairs annually, with the high in 2000. In 1994 the colony was abandoned following disturbance by jet skiers, and numbers were reduced in 1995 (Paul and Paul 2003). CBC census surveys during the 2006 to 2007 season recorded 110 individuals within the St. Petersburg survey area, 83 individuals within the Alafia Banks Sanctuary, 30 individuals within the Tampa survey area, and 208 individuals within the Bradenton survey area (Audubon Society 2007). The wood stork is currently listed as endangered. No critical habitat has been designated for wood storks in the GOM.

3.2.4.4 Threatened and Endangered Fish Species

Under the authority of the ESA, USFWS and NMFS are responsible for the protection and recovery of endangered and threatened fish species. NMFS has jurisdiction over most marine and anadromous fish listed under the ESA. Marine fish spend their entire life in salt water; anadromous fish are born in freshwater, migrate to the ocean to grow into adults, and then return to freshwater to spawn. USFWS has jurisdiction over freshwater fish. NMFS has jurisdiction over smalltooth sawfish (a marine/estuarine fish). USFWS and NMFS share jurisdiction over Gulf sturgeon (an anadromous fish). The only ESA-listed species that have the potential to occur in the Project area are smalltooth sawfish (*Pristis pectinata*) and Gulf sturgeon (*Acipenser oxyrinchus desotoi*). Smalltooth sawfish are expected to be rare in the terminal area and offshore areas of the Pipeline, but will have a greater likelihood for interaction in the shallower, inshore areas of the pipeline, during construction. There are few documented captures of smalltooth sawfish north of Charlotte Harbor (which is more than approximately 40 NM south of Tampa Bay) on Florida's west coast (NMFS 2009). However, recent efforts to document sawfish encounters have increased the numbers of reported occurrences in the upper half of the west coast of the Florida Peninsula and in the area north of Charlotte Harbor (NMFS 2009). As of 2008, there had been 20 encounters of smalltooth sawfish in Tampa Bay in 10 years (FMNH 2008). Gulf sturgeon are expected to be rare in both the Terminal and pipeline areas.

Smalltooth Sawfish. Endangered smalltooth sawfish (*Pristis pectinata*) is one of seven sawfish species that occur worldwide in tropical and subtropical rivers, lakes, and coastal areas. Like sharks and rays, smalltooth sawfish are elasmobranchs, and share life history characteristics similar to sharks. They are long-lived, slow-growing, slow to mature, and bear few young. These traits make all sawfish vulnerable to overfishing and slow to recover from depletion (NMFS 2009).

Smalltooth sawfish range from Brazil through the Caribbean and Central America, the GOM, and the Atlantic coast of the United States, and have also been recorded in Bermuda. Forms of smalltooth sawfish have been reported from the eastern Atlantic in Europe and West Africa; the Mediterranean; South Africa; and the Indo-West Pacific, including the Red Sea, India, Burma, and the Philippines. However, it is unknown whether populations outside the Atlantic are truly smalltooth sawfish or closely related species (NMFS 2009).

The range of the smalltooth sawfish in the Atlantic has been reduced over the past century. The northwestern extent of this species' Atlantic range is found in the waters of the eastern United States. Records of this species north of Florida occur during spring and summer periods (May to August). These are likely seasonal migrants, wanderers, or colonizers from a historic Florida core population to the south (NMFS 2009). Peninsular Florida has been the U.S. region with the largest numbers of capture records of smalltooth sawfish and seems to be the primary area where the species historically occurred year-round. The region where the largest numbers of smalltooth sawfish occur is in southern and southwestern Florida from Charlotte Harbor through the Dry Tortugas (NMFS 2009).

Smalltooth sawfish occur on the west coast of Florida, north of Charlotte Harbor, but historically appear to never have been as common in this region as in the east coast lagoons and South Florida. One of the

earliest published records from the west coast was reported in 1883 from the Cedar Keys off the northwestern Florida peninsula, and hundreds of smalltooth sawfish were reported on the Gulf coast of peninsular Florida in the late 1800s. Other captures during the 1800's were documented in Tampa Bay and in the southwestern coast off Charlotte Harbor and San Carlos Bay. Records of capture since that time period have been limited. There are few documented captures of sawfish from the area north of Charlotte Harbor. However, the recent work to document sawfish encounters has increased the numbers of reported occurrences in the upper half of the west coast of the Florida Peninsula and in the area north of Charlotte Harbor (NMFS 2009).

Smalltooth sawfish are found very close to shore in muddy and sandy bottoms, seldom descending to depths greater than 10 m (32 feet). They are often found in sheltered bays, on shallow banks, and in estuaries or river mouths. Most encounters of smalltooth sawfish occurred on mud substrates. One study reported encounters with sawfish by type of substrate as 61 percent on mud, 11 percent on sand, 10 percent seagrass, 7 percent limestone, 4 percent rock, 4 percent coral reef, and 2 percent sponge. Smalltooth sawfish are also reported to be associated in areas around mangroves, seagrasses, and the shorelines. Encounter data have also demonstrated that smaller smalltooth sawfish occur in shallower water, and larger sawfish occur regularly at depths greater than 10 m (32 feet) (NMFS 2009).

The primary reason for the decline of the smalltooth sawfish population has been bycatch in various commercial and recreational fisheries. The secondary reason for the decline of the smalltooth sawfish population is habitat loss and degradation. Other threats to the species include entanglement in marine debris, injury from saw removal, pollution, and disturbance of natural behavior by divers and other marine activities (NMFS 2009). NMFS listed the U.S. population of the smalltooth sawfish as an endangered species on April 1, 2003 (68 FR 15674–15680). There is no critical habitat currently designated for smalltooth sawfish. NMFS proposed two units of critical habitat on November 20, 2008, approximately 40 NM from the Project area in Charlotte Harbor and south (73 FR 70290–70308). Critical habitat is not proposed within the Project area.

Gulf Sturgeon. The threatened Gulf sturgeon is an anadromous fish with a partially cylindrical body imbedded with bony plates or scutes (USFWS and GSMFC 1995). The current population levels of Gulf sturgeon (*Acipenser oxyrinchus desotoi*) in rivers other than the Suwannee and Apalachicola are unknown, but are thought to be reduced from historic levels. Historically, the subspecies occurred in most major rivers from the Mississippi River to the Suwannee River, and marine waters of the central and eastern GOM to Florida Bay (USFWS and GSMFC 1995).

Tampa Bay was the location of the first recorded significant sturgeon fishery on the GOM coast; however it only lasted 3 years from 1886 through 1889, when only seven sturgeon were caught. Sturgeon catches have been reported sporadically since 1890. In the Tampa Bay basin, a commercial netter incidentally caught and released a Gulf sturgeon one mile west of Redington Beach near St. Petersburg in December 1992. Before this time, the most recent Gulf sturgeon catch reported from Tampa Bay was collected in December 1987 near Pinellas Point. Recent sightings have been limited to coastal Alabama, Mississippi, and the Florida Panhandle (USFWS 2004a).

As anadromous fish, Gulf sturgeon feed in estuarine waters and spawn in fresh water. Subadult and adult Gulf sturgeon are believed to spend 8 to 9 months in rivers and 3 to 4 months (the cooler months) in estuaries. Gulf sturgeon that are less than 2 years old remain in estuaries throughout the year. In the Suwannee River, the primary habitat is limestone and sand. In the rivers, Gulf sturgeon are known to congregate below springs and areas of turbulent flows. Open water habitats are believed to be muddy and soft bottom and possibly seagrass (USFWS and GSMFC 1995).

The decline of Gulf sturgeon was likely caused by overexploitation and exacerbated by damming of rivers (USFWS and GSMFC 1995). Critical habitat for Gulf sturgeon was designated in March 2003 (68 FR 13370–13494). There is no critical habitat for Gulf sturgeon in the Port area. The closest critical habitat for Gulf sturgeon is approximately 90 NM from the Project area.

3.2.5 Benthic Resources

Benthos refer to both substrate (habitat) and organisms that occupy that substrate. Benthic habitats are characterized by physical or structural features, such as topography, substrate type, sediment grain size, and water depth, and by the presence of emergent biogenic structures (i.e., structures formed by plants or animals), such as coral reefs, oyster reefs, and tube assemblages (GMFMC 2004).

In general, the benthic habitat on the west Florida Shelf is predominantly carbonate sediments, with low-relief hard bottom, coralline algal nodules and pavement, and unconsolidated shell rubble. Sediments are composed of quartz-shell sand (i.e., greater than 50 percent quartz), shell-quartz sand (i.e., less than 50 percent quartz), shell sand, and algal sand. The west Florida shelf provides a large area of scattered hard substrates, some emergent, but most covered by a thin veneer of sand. Hard substrates are colonized by a variety of hardy, tropical reef biota, such as algae, sponges, stony corals, hydroids, octocorals, anemones, and bryozoans intermingled with sand bottoms (GMFMC 1998).

The offshore hard-bottom communities of the West Florida shelf can be grouped into various assemblages based on similarities and dissimilarities. The assemblages that would occur in the Project area include Inner and Middle Shelf Live Bottom Assemblage II identified in water depths of 75 m (246 feet) to 25 m (82 feet) and the Inner Shelf Live Bottom Assemblage I identified in water depths of 27 m (89 feet) to 20 m (66 feet) (GMFMC 2004).

The Inner and Middle Shelf Live Bottom Assemblage II consists of algae, sea squirts, bryozoans, hard corals, small sea fans, hydrozoans, and several sponges. This assemblage is characterized by a higher number of sponges than the Inner Shelf Live Bottom Assemblage I. The Inner Shelf Live Bottom I consists of patches of algae, ascidians, large sea fans, hydrozoans, and sponges. This assemblage generally has larger organisms and a higher biomass per unit area than the Inner and Middle Shelf Live Bottom II (GMFMC 2004).

The nearshore benthic habitat (from depths of 18 m [60 feet] to shore) on the west Florida shelf is characterized by spotty sediment covering large expanses of limestone, with rock ledges and sinkholes. Rocky bottom is colonized by sponges, soft corals, true corals, and anemones. These provide commercially important fish and shellfish habitat (GMFMC 2004).

Approximately 80 percent of Tampa Bay is covered by sand or mud bottom, including hard-packed sand and shell. These sediments support a large variety of organisms, including parchment worms, clams, sea squirts, and conchs. In 1993, more than 500 types of macroinvertebrates were identified baywide, with an average density of 10,000 organisms per square meter (SWFWMD 1999).

Hard-bottom habitats also occur in Tampa Bay. Sessile invertebrates such as corals, barnacles, sponges, and algae colonize natural outcroppings of rock or limestone—or man-made bridge pilings or reefs in these habitats. More than 850 acres of hard-bottom communities were identified in the shallow areas of Tampa Bay in 1994. It is likely that additional hard-bottom communities are associated with deeper areas of the Tampa Bay ship channel where rock has been exposed due to dredging (Savercool and Lewis 1994). Three distinct hard-bottom habitats that were identified by aerial photographs in shallow areas: native limestone outcroppings, artificial habitat such as concrete bridge rubble, and living oyster reefs. Similar organisms with slight variations occur within each habitat type. Hard corals and macroalgae

(*Sargassum filipendulum* and *Caulerpa mexicana*) only occurred in the native limestone. However, the native limestone was the only habitat type that did not support amphipods. Oysters only occurred in the oyster reef habitat (Savercool and Lewis 1994). Long-term trends and current hard bottom coverage in Tampa Bay are not available. However, eight artificial reefs have been established in Tampa Bay to expand natural hard bottom and enhance fishing (SWFWMD 1999).

Seagrasses (vascular plant) and macroalgae (nonvascular plant) are important primary producers in the marine environments. They also provide nursery grounds to important recreational and commercial fish species and habitat for many larval and adult invertebrates. Five species of seagrass are common to the GOM. These include turtle grass (*Thalassia testudinium*), shoal grass (*Halodule wrightii*), manatee grass (*Syringodium filiforme*), star grass (*Halophila engelmanni*), and paddle grass (*Halophila decipens*). Widgeon grass (*Ruppia maritima*) is also common, but not considered a true seagrass. It is a fresh water species that is capable of living in a saline environment but also occurs in the GOM. Macroalgae species of *Caulerpa*, *Udotea*, *Penicillus*, and *Sargassum* are also common to this area of the GOM (GMFMC 1998).

Benthic Community Survey. The Applicant performed a 27,985-acre benthic survey at the proposed buoy system array footprint and proposed pipeline corridor (Port Dolphin 2008d). Side-scan sonar, photodocumentation (video and still photographic data), and diver surveys were used to identify marine benthic communities within the Project area. Surveyed habitats were classified into six habitat types, presented in **Table 3.2-4**. Approximately 33 percent of the proposed Route Alternative was hard- or live-bottom habitat. Five of these six habitat types were identified in the survey: soft substrate/sand; Types A, B, and D; and seagrass. Approximately 6 percent was Type A habitat, 17 percent was Type B habitat, and 10 percent was Type D habitat. **Appendix D** presents detailed maps of the hard-bottom areas in the proposed Port Site and pipeline route Alternative. Organisms that were characteristic to the hard-bottom habitat in the survey are presented in **Table 3.2-5** (Port Dolphin 2007d). Organisms characteristic of soft-bottom habitat are presented in **Table 3.2-5a**. Soft-bottom species were not quantified because survey protocols from both MMS and FDEP required that quantitative photos only be taken of live-bottom areas, not soft-bottom. Many of the organisms observed in the soft-bottom areas are motile species that move along the seafloor.

Table 3.2-4. Habitat Types Identified in the Benthic Survey

Habitat Type		Description
Hard- or Live-Bottom	Type A	20 percent to 100 percent cover by attached epibenthic biota or hard bottom with greater than or equal to 0.25 m (0.8 feet) in relief, inclusive of sand components integral to these habitats. EFH, Habitat Area of Particular Concern
	Type B	5 percent to 20 percent cover by attached epibenthic biota or hard bottom with less than 0.25 m (0.8 feet) in relief, inclusive of sand components integral to these habitats. EFH, Habitat Area of Particular Concern
	Type C	Breakwater spoil area. EFH, Habitat Area of Particular Concern
	Type D	Sand (soft substrate/sedimentary habitat) in proximity to reef/hard-bottom resources, a sandy veneer over hard substrate with less than 5 percent epibenthic coverage. EFH
Soft Substrate/Sand		Soft substrate/sedimentary habitats not associated with hard-bottom ecotones.
Seagrass		Areas that contained turtle grass, manatee grass, and shoal grass, as determined by dive surveys.

Source: Port Dolphin 2007d

Table 3.2-5. Species Characteristic of Hard-bottom Habitat

Scientific Name	Common Name
Cnidaria	
Cladocora arbuscula	Tube coral
Dichocoenia stokesii	Elliptical star coral
Oculina robusta	Robust ivory tree coral
Scolymia cubensis	Artichoke coral
Siderastrea sidereal	Massive starlet coral
Siderastrea radians	Lesser starlet coral
Solenastrea bournoni	Smooth star coral
Solenastrea hyades	Knobby star coral
Stephanocoenia intercepta	Blushing star coral
Pseudopterogorgia sp.	Sea plumes
Pterogorgia sp.	Sea whip
Carijoa riisei	White telesto
Leptogorgia sp.	Sea whip
Caryophylliidae	Unidentified cup corals
Zoanthidae	Unidentified zoanthids
Hydroida	Unidentified hydroids
Porifera	
Axinella sp.	Finger sponge
Cinachyra sp.	Orange ball sponge
Halicondria sp.	Unknown
Callyspongia sp.	Vase sponge
Cliona sp.	Yellow boring sponge
Spirastrella sp.	Encrusting sponge
Geodia sp.	Leathery barrel sponge
Placospongia sp.	Unknown
Pseudaxinella sp.	Unknown
Tethya crypta	None
Speciospongia sp.	Loggerhead sponge
Porifera	Unidentified sponges
Urochordata	
Ascidacea	Unidentified tunicates
Bryozoa	
Bryozoa	Unidentified bryozoans
Algae	
Caulerpa sertuloides	Green algae
Caulerpa sp.	Green algae
Halimeda sp.	Calcified green algae
Codium sp.	Green algae
Valonia sp.	Green algae
Macroalgae	Unidentified algae

Source: Port Dolphin 2007d

Table 3.2-5a. Species Characteristic of Soft-bottom Habitat

Scientific Name	Common Name
Algae	
Caulerpa prolifera	Oval blade alga
Caulerpa sertularoides	Green feather alga
Caulerpa mexicana	Flat green feather alga
Udotea sp.	Green algae
Halimeda sp.	Green algae
Codium sp.	Green algae
Dictyota sp.	Brown algae
Gracilaria sp.	Red algae
Macroalgae	Unidentified algae
Echinodermata	
Lytechinus variegatus	Variegated sea urchin
Astropecten articulatus	Royal sea star
Clypeaster sp.	Sea biscuit
Oreaster reticulates	Cushion sea star
Crustacea	
Callinectes sapidus	Blue crab
Portunidae	Unidentified swimming crab
Calappidae	Unidentified box crab
Mollusca	
Busycon perversum	Lightning whelk
Cassis tuberosa	Helmet conch
Cnidaria	
Pennatulacea	Sea pen
Plexauridae	Unidentified soft coral
Porifera	
Ircinia sp.	Sponge
Cliona sp.	Yellow boring sponge
Fish	
Diplectrum formosum	Sand perch

Survey results indicate that the majority of hard-bottom areas were offshore in water depths of 12 to 15 m (40 to 50 feet) and water depths from 21 to 27 m (70 to 90 feet). The relief ranged from 0 to 2.0 m (0 to 6.5 feet) and was generally oriented northeast to southwest. In depths of 12 to 15 m (40 to 50 feet), communities were dominated by macroalgae (accounting for 34 to 68 percent of benthic cover). Therefore, habitats within this depth range were classified as Type A, although nonalgal coverage composes 0 to 6 percent of the total benthic cover. The Applicant based their habitat characterization in the survey area on structural relief and nonalgal benthic biotic coverage. In deeper waters > 30.5 m (> 100 feet) macroalgal abundance was less pronounced and emergent substrate was uncommon to rare

(Port Dolphin 2007d). Smaller sporadic patches of paddle grass (*Halophila decipiens*) and *Caulerpa* sp. were observed in deeper offshore areas of the proposed Site and pipeline route. These patches account for approximately 0.7 percent of the surveyed offshore portion of the pipeline route (Port Dolphin 2008a). Unavoidable impacts on seagrass would be avoided and minimized to the extent practicable.

The Southern Route Alternative for the pipeline was similar to the proposed Route Alternative. Approximately 37 percent was hard- or live-bottom habitat. The primary difference was that there was less Type B habitat and more Type D habitat in the Southern Route Alternative. Approximately 4 percent was Type A habitat, 5 percent was Type B habitat, and 28 percent was Type D habitat. Survey results in Tampa Bay were similar for both the revised inshore pipeline route (proposed Pipeline route) and the original inshore pipeline route (Pipeline Alternative). Soft substrate/sand was the dominant habitat type within Tampa Bay for both routes. Small areas of sporadic hard bottom were scattered throughout the bay for both routes. Hard-bottom communities included octocorals, sponges, hydroids, bryozoans, and various other invertebrates. Fields of one species of tunicate were observed in Tampa Bay, but not offshore. It is not known whether this species is native or nonnative. Paddle grass and *Caulerpa* sp. accounted for approximately 4.8 percent of the surveyed offshore portion of the Southern Route Alternative (Port Dolphin 2008a).

Artificial substrate in the proposed Site and pipeline route were areas of dredge spoil (colonized primarily by sponges, tunicates, macroalgae, and some octocorals) and an artificial reef created as mitigation for hard- or live-bottom for impacts associated with installation of the Gulfstream Pipeline. These were both classified as Habitat Type A (Port Dolphin 2007b). Artificial substrate, such as mitigation reefs, bridge rubble, miscellaneous debris, and an unidentified "dome" structure (possibly oceanographic equipment), was also observed in the Pipeline Alternative. Bridge rubble was colonized by octocorals, sponges, macroalgae, and other various invertebrates in the Pipeline Alternative (Port Dolphin 2007d).

Approximately 1 percent of the area surveyed for the inshore portion of the Alternative Route (195 acres) was seagrass habitat identified off Port Manatee (Port Dolphin 2007b). This area overlaps soft substrate/sand habitat. The benthic survey confirmed that turtle grass, manatee grass, shoal grass, widgeon grass, and star grass were present along the inshore portion of the Pipeline Alternative in depths less than 2.1 m (7 feet) and concentrated in shallow waters around Manbirdtee Island, south of Port Manatee.

3.2.6 Nonthreatened and Nonendangered Marine Mammals

Introduction

Under the authority of the MMPA of 1972 (16 U.S.C. 1361 et seq.), the Secretary of Commerce is responsible for the protection of all marine mammals except walruses, polar bears, sea otters, manatees, and dugongs, which are the responsibility of the Secretary of the Interior. These responsibilities have been delegated to NMFS and the USFWS, respectively, and include providing overview and advice to regulatory agencies on all Federal actions that might affect these species.

The MMPA prohibits the "take" of marine mammals, with certain exceptions, in waters under U.S. jurisdiction and by U.S. citizens on the high seas. Under Section 3 of the MMPA, "take" is defined as "harass, hunt, capture, kill, or attempt to harass, hunt, capture or kill any marine mammal." "Harassment" is defined as any act of pursuit, torment, or annoyance that has the potential to injure marine mammal stock in the wild; or has the potential to disturb marine mammal stock in the wild by disrupting behavioral patterns, including migration, breathing, nursing, breeding, feeding, or sheltering. In cases where U.S. citizens are engaged in activities, other than fishing, that result in "unavoidable" incidental take of marine mammals, the Secretary of Commerce can issue a "small take authorization." The

authorization can be issued after notice and opportunity for public comment if the Secretary of Commerce finds minor impacts.

Two baleen whales and 20 toothed whales (e.g., dolphins) have documented occurrences in the GOM (Würsig et al. 2000). Of these 22 cetacean species, and based on available survey data, only the bottlenose dolphin, Atlantic spotted dolphin, and rough-toothed dolphin occur on the continental shelf in the eastern GOM (Fulling et al. 2003). Other species of dolphins and an occasional whale are sometimes observed in nearshore GOM waters and might infrequently strand on Gulf and bay beaches, but these are not considered normal occurrences for those deepwater species that occur more regularly in waters around and seaward of the continental shelf break (Mullin and Fulling 2003a, Mullin et al. 2004). The remainder of the document focuses on those marine mammal species with the greatest likelihood of occurrence in the Proposed Action area. **Table 3.2-6** outlines those species documented within the northern GOM.

Table 3.2-6. Nonendangered and Nonthreatened Marine Mammal Species with Documented Occurrence in the Northern GOM

Common Name	Scientific Name	Strategic Stock?
Order Cetacea (whales, dolphins, and porpoises), Suborder Mysticeti (baleen whales)		
Minke whale	*Balaenoptera acutorostrata*	--
Bryde's whale	*Balaenoptera brydei*	--
Order Cetacea, Suborder Odontoceti (toothed whales)		
Pygmy killer whale	*Feresa attenuata*	N
Short-finned pilot whale	*Globicephala macrorhynchus*	N
Risso's dolphin	*Grampus griseus*	N
Pygmy sperm whale	*Kogia breviceps*	N
Dwarf sperm whale	*Kogia sima*	N
Fraser's dolphin	*Lagenodelphis hosei*	N
Sowerby's beaked whale	*Mesoplodon. bidens*	Y
Blainville's beaked whale	*Mesoplodon densirostris*	-Y
Gervais' beaked whale	*Mesoplodon europaeus*	-Y
Killer whale	*Orcinus orca*	N
Melon-headed whale	*Peponocephala electra*	N
False killer whale	*Pseudorca crassidens*	N
Pantropical spotted dolphin	*Stenella attenuata*	N
Clymene dolphin	*Stenella clymene*	N
Striped dolphin	*Stenella coeruleoalba*	N
Atlantic spotted dolphin	*Stenella frontalis*	N
Spinner dolphin	*Stenella longirostris*	N
Rough-toothed dolphin	*Steno bredanensis*	N
Bottlenose dolphin	*Tursiops truncatus*	Y*
Cuvier's beaked whale	*Ziphius cavirostris*	N

Note: *The GOM bay, sound, and estuarine stocks, and each management unit in the northern GOM coastal stock are considered strategic stocks. The northern GOM oceanic stock, and the northern GOM continental shelf stock are not considered strategic stocks.

Marine Mammal Hearing

When considering the influence of various kinds of noise on the marine environment, it is necessary to understand that different kinds of marine life are sensitive to different frequencies of sound. Information on hearing in marine mammals is based on the frequencies of sounds produced, behavioral observations, anatomical evidence, and extrapolations from what is known about other marine mammal hearing. Marine mammal hearing varies among species; however, as a group, marine mammal hearing ranges are generally from 0.01 to 200 kHz. Broad generalizations can be made about groups of marine mammals. For example, most toothed whales (odontocetes) hear well in ultrasonic ranges, with functional hearing from 0.15 kHz to 180 kHz. Some toothed whales are able to hear frequencies as high as 200 kHz (NRC 2003). Southall et al. (2007) delineated three groups of cetaceans based on similarities in their hearing: low-frequency cetaceans (0.007 Hz to 22 kHz), mid-frequency cetaceans (150 Hz to 160 kHz), and high-frequency cetaceans (0.2 kHz to 180 kHz).

Data on the hearing abilities of cetaceans are sparse, particularly for the larger cetaceans such as the baleen whales. The auditory thresholds of some of the smaller odontocetes have been determined in captivity (Ljungblad et al. 1982, Thomas et al. 1988, Houser et al. 2008). It is generally believed that cetaceans should at least be sensitive to the frequencies of their vocalizations. Comparisons of the anatomy of cetacean inner ears and models of the structural properties and the response to vibrations of the ear's components in different species provide an indication of likely sensitivity to various sound frequencies. The ears of small-toothed whales are structurally optimized for receiving high-frequency sound, while baleen whale inner ears are best optimized for low to infrasonic frequencies (Ketten 1992, 1997). As such, baleen whales are considered to be low-frequency cetaceans (Southall et al. 2007).

All of the delphinid species potentially occurring in the Proposed Action area would fall into the category of mid-frequency cetaceans as defined by Southall et al. (2007). Ketten et al. (1992) felt that, based on the ear morphology and studies on other manatee subspecies (Klishin et al. 1990, Popov and Supin 1990) manatees likely hear best in the lower frequencies (1 kHz to 5 kHz) and are not likely to hear above 20 kHz. The only available behavioral audiogram for a sirenian is from the West Indian manatee, where peak sensitivity of hearing was between 16 and 18 kHz with functional hearing limits between 400 Hz and 46 kHz (Gerstein et al. 1999, Gerstein 2002).

See **Section 3.2.4.1** for general information on marine mammal hearing. All of the delphinid species potentially occurring in the Proposed Action area (bottlenose dolphin, Atlantic spotted dolphin, and rough-toothed dolphin) would fall into the category of mid-frequency cetaceans (as defined by Southall et al. 2007).

Bottlenose Dolphin. The bottlenose dolphin is a common inhabitant of both the continental shelf and slope in the GOM, generally in waters less than 20 m (66 feet) (Griffin and Griffin 2003). The species is also distributed throughout the bays, sounds, and estuaries of the GOM (Mullin et al. 1990). As noted by Waring et al. (2008), the identification of biologically meaningful "stocks" of bottlenose dolphins in these waters is complicated by the high degree of behavioral variability exhibited by this species and by the lack of requisite information for much of the region. Distinct stocks are provisionally identified in each of 33 areas of contiguous, enclosed or semi-enclosed bodies of water adjacent to the GOM.

For management purposes, the bottlenose dolphin stocks in the northern GOM coastal waters have been divided into separate stocks: eastern, northern, and western. Waring et al. 2008 then further refines these animals into "communities" (as defined in Wells et al. 1987). The eastern coastal bottlenose dolphin stock area extends from 84°W longitude to Key West, Florida (Waring et al. 2008); this stock, along with animals from the GOM bay, sound, and estuarine stocks, are expected in the Proposed Action area. All of these stocks are designated as strategic stocks because the removal of a small number of animals, not

including natural mortalities, could potentially drop the populations to levels that would decrease their ability to maintain optimum sustainable population levels. In the vicinity of the Proposed Action, there are distinct geographic subdivisions with year-round resident animals from Tampa Bay, Sarasota Bay, and Charlotte Harbor as well as a seasonal coastal stock (1 to 12 km [0.5 to 6.5 NM] offshore) with mixing on a limited basis (Wells et al. 1996, Wells and Scott 2002, Sellas et al. 2005). The Sarasota community's range extends from southern Tampa Bay southward through Sarasota Bay, and into the GOM about 1 km (0.5 NM) offshore. Waring et al. (2008) identified the animals in Tampa Bay as having a best estimate of abundance of 559 individuals and those in Sarasota Bay as having a best abundance estimate of 97 individuals. Tursiops are opportunistic feeders, taking a wide variety of fish, cephalopods, and shrimp (Wells and Scott 1999) and using a wide variety of feeding strategies (Shane 1990). In the GOM, bottlenose dolphins often feed in association with shrimp trawlers (Fertl and Leatherwood 1997). In addition to use of active echolocation to find food, bottlenose dolphins likely detect and orient to fish prey by listening for the sounds they produce—so-called "passive listening" (Barros and Myrberg 1987, Gannon et al. 2005). Nearshore bottlenose dolphins prey predominately on coastal fish and cephalopods, while offshore individuals prey on pelagic cephalopods and a large variety of epi- and mesopelagic fish species (Van Waerebeek et al. 1990, Mead and Potter 1995).

Atlantic Spotted Dolphin. There are two species of spotted dolphin in the Atlantic Ocean, the Atlantic spotted dolphin (*Stenella frontalis*) and the pantropical spotted dolphin (*S. attenuata*). Where they co-occur, Atlantic spotted dolphins are often times hard to distinguish from the pantropical spotted dolphin (Waring et al. 2008, Herzing et al. 2003).

Currently, Atlantic spotted dolphins in U.S. waters are managed as two separate units designated as GOM and western North Atlantic stocks, respectively (Waring et al. 2008). The best abundance estimate for Atlantic spotted dolphins on the OCS in the GOM is 27,393 (Fulling et al. 2003, Waring et al. 2008). Atlantic spotted dolphins in the northern GOM are abundant in continental shelf waters from between 10 and 200 m (33 to 656 feet) to slope waters < 500 m (1,640 feet) (Fulling et al. 2003, Mullin and Fulling 2003a). Griffin and Griffin (2003) reported that on the West Florida shelf they are more common in waters from 20 to 180 m (66 to 591 feet), while Mullin et al. (2004) found that Atlantic spotted dolphins were sighted in waters with a bottom depth typically < 300 m (984 feet). Griffin and Griffin (2004) reported higher abundances of spotted dolphins on the west Florida Shelf between the months of November and May than during the rest of the year.

Atlantic spotted dolphins in the GOM have been seen feeding cooperatively on clupeid fishes and are known to feed in association with shrimp trawlers (Fertl and Würsig 1995, Fertl and Leatherwood 1997, respectively). In the Bahamas, this species has been observed to chase and catch flying fish (MacLeod et al. 2004). The only information on dive depth for this species is based on a satellite-tagged individual from the GOM (Davis et al. 1996). This individual made short, shallow dives (more than 76 percent of the time to depths < 10 m) over the continental shelf, although some dives were as deep as 40 to 60 m (Davis et al. 1996).

Rough-toothed dolphin. The rough-toothed dolphin is typically considered to be an oceanic species, occurring seaward of the shelf break, although this species is known to come into shallower waters. Tagging and sighting data document occurrence of this species in waters over the continental shelf off the Gulf Coast of Florida (Wells et al. 1999, Fulling et al. 2003).

The best estimate of abundance for rough-toothed dolphins is 2,942 individuals (Waring et al. 2008).

Cephalopods and fish, including large fish, such as dorado (*Coryphaena hippurus*), are prey (Miyazaki and Perrin 1994). Stomach content analyses of a group of rough-toothed dolphins that stranded during

May 1961 in the northern GOM revealed that blanket octopus (*Tremoctopus violaceus*) had been taken by some of the animals (Würsig et al. 2000).

3.2.7 Nonthreatened and Nonendangered Coastal and Marine Birds

The waters and adjacent coastal areas of the northern GOM are inhabited by a diverse assemblage of resident and migratory birds (Clapp et al. 1982). There are four groups of coastal and marine birds that inhabit these areas: seabirds, shorebirds, marsh and wading birds, and waterfowl (MMS 2001). Most of the migrant birds overwinter in tropical Central America and South America, breed in eastern North America, and directly cross the GOM (trans-Gulf migration) or move north or south by traversing the GOM coast or the Florida Peninsula (MMS 2002b). Examples of birds occurring in the Tampa Bay region are presented in **Table 3.2-7**, but discussion is limited to those species that might occur within coastal margins and nearshore and offshore waters in the vicinity of Tampa Bay. Federally listed coastal and marine bird species are discussed in **Section 3.2.4.3**.

Three colonies in Tampa Bay: Alafia Bank in Hillsborough Bay at the mouth of the Alafia River, Washburn Sanctuary in Terra Ceia AP, and Tarpon Key in Boca Ciega Bay are among the most diverse colonies in the United States.

The Tampa Bay system is home to 28 species of colonial waterbirds and allies, annually totaling about 30,000 to 45,000 breeding pairs and their young, or nearly 200,000 individuals. As many as half of these species breed in Hillsborough Bay, and Audubon of Florida manages some 15 critically important natural or man-made islands in the Tampa Bay system. Beach-nesting species such as terns, plovers, and black skimmers warrant special attention as their habitat is increasingly limited by coastal development, as do species such as the white ibis (*Eudocimus albus*), which are especially vulnerable to losses of fresh water wetlands that provide food for their young (TBEP 2006).

Many rare or coastal species nesting in Tampa Bay experienced sustained population increases between 1994 and 2001, including reddish egret (*Egretta rufescens*); roseate spoonbill (*Platalea ajaja*); American oystercatcher (*Haematopus palliatus*); and caspian (*Hydroprogne caspia*), royal (*Thalasseus maximus*) and sandwich (*Thalasseus sandvicensis*) terns. El Niño rains created extremely advantageous foraging conditions in 1998, and breeding populations of some species, such as white ibis, almost tripled before returning to pre-1998 conditions in 1999 (TBEP 2006).

3.2.7.1 Seabirds

Seabirds are defined as those species that spend extended periods away from land and obtain all or most of their food from the sea while flying, swimming, or diving. Five taxonomic orders of seabirds (broadly defined as those species that spend a large portion of their lives on or over seawater) are found in both offshore and coastal waters of the GOM. Some species of this group inhabit only pelagic habitats in the GOM (OCS and beyond) (e.g., boobies, petrels, and shearwaters). Most GOM seabird species, however, inhabit waters of the continental shelf, and adjacent coastal and inshore habitats (Clapp et al. 1982).

GOM seabirds are categorized into four broad categories: summer migrant pelagics, summer residents, wintering marine species, or permanent residents (Fritts and Reynolds 1981). Summer migrant pelagic species are those that are present in the GOM during the summer but breed primarily elsewhere. Examples include black terns, boobies, shearwaters, storm petrels, and tropicbirds. Summer residents are those that are present during summer months but also breed in the GOM. Examples include least terns, sandwich terns, and sooty terns. Wintering marine bird species are those that can be found in the GOM only during winter months. Examples of wintering species include herring gulls, ring-billed gulls,

Table 3.2-7. Coastal and Marine Birds Breeding in the Tampa Bay Area

Category	Common Name	Scientific Name	Number of Nesting Pairs*
Seabirds	Black skimmer	*Rhynchops niger*	600 to 700 pairs
	Brown pelican	*Pelicanus occidentalis*	1,000 pairs
	Double-crested cormorant	*Phalacrocorax auritus*	fewer than 400 pairs
	Laughing gull	*Larus atricilla*	10,000 to 15,000 pairs
	Caspian tern	*Sterna caspia*	90 pairs
	Gull-billed tern	*Gelochelidon nilotica*	0 to 10 pairs
	Least tern	*Sterna antillarum*	100 to 150 pairs
	Roseate tern	*Sterna dougalii*	NC
	Royal tern	*Sterna maxima*	3,700 pairs
	Sandwich tern	*Sterna sandvicensis*	750 pairs
Shorebirds	American oystercatcher	*Haematopus palliatus*	minimum of 125 pairs
	Piping plover	*Charadrius melodus*	NC
	Southeastern snowy plover	*Charadrius alexandrinus*	maximum of 3 pairs
	Wilson's plover	*Charadrius wilsonia*	100 pairs
Marsh and Wading Birds	Anhinga	*Anhinga anhinga*	200 to 300 pairs
	Cattle egret	*Bubulcus ibis*	5,000 pairs
	Great egret	*Ardea alba*	500 to 800 pairs
	Reddish egret	*Egretta rufescens*	60 to 75 pairs
	Snowy egret	*Egretta thula*	800 to 1,000 pairs
	Black-crowned night heron	*Nycticorax nycticorax*	200 to 250 pairs
	Great blue heron	*Ardea herodias*	NC
	Green heron	*Butorides virescens*	NC
	Yellow-crowned night heron	*Nyctanassa violacea*	90 to 190 pairs
	Little blue heron	*Egretta caerulea*	300 pairs
	Tricolored heron	*Egretta tricolor*	500 to 700 pairs
	Glossy ibis	*Plegadis falcinellus*	400 to 600 pairs
	White ibis	*Eudocimus albus*	6,000 to 11,000 pairs
	Wood Stork	*Mycteria americana*	40 to 160 pairs
	Roseate spoonbill	*Ajaia ajaja*	110 to 180 pairs
	Wouldet	*Catoptrophorus semipalmatus*	100 pairs

Source: Paul and Paul 2003

Notes:

*Censused annually in the Tampa Bay region from 1994 through 2001.

NC = Not censused

jaegers, and the northern gannet. Ring-billed gulls are common within the Project area. Permanent resident species are found in the GOM year-round. Examples of permanent residents include bridled terns, laughing gulls, magnificent frigate birds, royal terns, and double-crested cormorants. Laughing gulls are common and abundant within the Project area. CBC surveys conducted during 2006 to 2007

recorded densities of approximately 1,760 individuals within the Alafia Bank Bird Sanctuary, 2,300 individuals within the Tampa survey area, and 6,500 individuals within the Bradenton survey area (Audubon Society 2007).

Shorebirds. Shorebirds include members of the Order Charadriiformes, which outside of their migratory cycles are generally restricted to coastline margins. Shorebirds are among the world's greatest migratory animals. Many North American shorebirds seasonally traverse between the high Arctic and South America, and occasionally spill over into Asia and Europe. Certain coastal and adjacent inland wetland habitats of the GOM serve as vital overwintering habitats and temporary "staging" habitats for shorebirds. Staging birds (those migrant species that reside temporarily along the Gulf Coast) forage within coastal habitats in an effort to accumulate energy reserves necessary for the completion of their migratory efforts (MMS 2001). Many shorebird species typically aggregate in large numbers within select GOM coastal habitats. In addition, many of the overwintering shorebird species remain within specific areas throughout the season and return to the same areas each year. These species are susceptible to localized habitat loss or degradation.

From CBC surveys, seasonally common and abundant shorebirds in the Project area include wouldet, black-bellied plover, sanderling, dunlin, short-billed dowitcher, least sandpiper, and killdeer (Audubon Society 2007).

Marsh and Wading Birds. The wetland bird group includes a diverse array of species that typically inhabit most Gulf coast aquatic habitats, ranging from fresh water swamps and waterways to brackish and saltwater wetlands and embayments. Many wetland birds are year-round residents on the GOM coast. Common and abundant wetland bird species within the Project area include white ibis, common moorhen, and American coot (Audubon Society 2007).

Waterfowl. Waterfowl are members of the order Anseriformes that inhabit fresh water and marine aquatic habitats. Many of these birds are migrant species that, primarily during winter months, inhabit coastal waters, beaches, flats, sandbars, and wetland habitats along the GOM (MMS 2001). Seasonally common and abundant waterfowl species within the Project area include mallard, lesser scaup, and northern shoveler (Audubon Society 2007).

Migratory Birds. The GOM is an important pathway for migratory birds, including many coastal and marine species, and large numbers of terrestrial species. Most migrant birds that overwinter in tropical Central and South America and breed in eastern North America either directly cross the GOM or move north or south by traversing the Gulf coast or the Florida peninsula.

3.2.8 Plankton

Plankton are free-floating or weakly swimming organisms that are suspended in the water column. They have such limited powers of locomotion that they passively drift at the mercy of the prevailing water movements. Phytoplankton are the tiny plants and microscopic algae capable of photosynthesizing organic material from water, CO_2, and light (i.e., primary production). Zooplankton are small animals such as the single-celled protozoans and the larval or adult forms of marine invertebrates and other higher animals (Thurman and Weber 1984).

Holoplankton (e.g., copepods) spend their entire life as plankton, while meroplankton spend only a portion of their life cycles as plankton. Meroplankton include both the egg and larval stages of benthic invertebrates and fish (i.e., ichthyoplankton). Hereafter, holoplankton would be referred to as "zooplankton" and meroplankton would be referred to as "planktonic fish and shellfish" or "ichthyoplankton" (when referring to planktonic fish only).

3.2.8.1 Phytoplankton

Phytoplankton form the base of the pelagic marine food web by directly and indirectly supporting communities of zooplankton, nekton (i.e., free swimming organisms), and microbes (i.e., bacteria). Because phytoplankton are photosynthetic, their occurrence is generally limited to the euphotic zone (i.e., depth of light penetration sufficient for primary production) (Thurman and Weber 1984). The phytoplankton of the west Florida shelf consists mainly of diatoms and dinoflagellates. However, blue-green algae and other microscopic bacterioplankton are thought to be 10 to 60 times more productive than phytoplankton (Okey and Mahmoudi 2002).

The dominant diatoms in the oceanic waters of western Florida include species of *Ethmodiscus*, *Gossleriella*, and *Planktoniella*. The dominant dinoflagellates in oceanic waters are species of *Amphisolenia*, *Heterodinium*, and *Pyrocystis*. Species of the blue-green algae, *Oscillatoria* are also common in oceanic waters (Vargo and Hopkins 1990).

The dominant diatom species in western Florida estuaries is *Skeletonema costatum*. Other dominant estuarine diatom species include *Chaetoceros* spp., *Asterionellopsis glacialis*, *Rhizosolenia* spp., and *Bellerochea malleus*. Common dinoflagellate species in estuaries were *Ceratium furca*, C. hircus, *Alexandrium balechii*, *Gynodinium splendens*, and several *Peridinium* and *Procentrum* species. *Gymnodinium breve* is a toxic algae that is dominant during red tide blooms (Vargo and Hopkins 1990).

3.2.8.2 Zooplankton (Holoplankton)

Zooplankton can occur throughout the water column from surface to bottom, and exhibit diurnal migrations throughout various depths. They represent a vital link between the primary producing phytoplankton and larger marine organisms (e.g., invertebrates and fish) in the marine food web, and they support a variety of commercially important finfish and shellfish species (Thurman and Weber 1984). On the western Florida shelf, the highest zooplankton abundance is associated with a salinity gradient in nearshore waters, a vertical density gradient (due to temperature and salinity) (i.e., zooplankton is more abundant in cooler upwelled water than warmer surface water) in offshore waters, and with an increase in particulate matter (Okey and Mahmoudi 2002).

The zooplankton community of the GOM shelf waters is less diverse and more abundant than in deeper oceanic waters. In the shelf waters, zooplankton is dominated by calanoid copepod species such as *Centropages*, *Eucalanus, Labidocera,* and *Paracalanus*. Euphausiids (krill) and chaetognaths are also common. Dominant Euphasiids include species of *Euphausia* and *Stylocheiron,* while the most common chaetognath species is *Saggitta helenae*. Biomass of oceanic zooplankton decreases with depth and varies throughout the day because of diel vertical migrations (Vargo and Hopkins 1990).

In the estuaries of western Florida, meroplankton are more important than in the shelf waters although holoplankton are still present in estuarine waters. The most important copepod species of Tampa Bay are *Acartia tonsa*, *Parvocalanus crassirostris*, *Oithona colcarva,* and *O. nana*. The chaetognaths *Saggitta hispida* and *S. tenuis* are also common (Vargo and Hopkins 1990).

3.2.8.3 Planktonic Fish and Shellfish

Many commercially, recreationally, and ecologically important fish and invertebrate species are planktonic as eggs and larvae (i.e., meroplankton). Fish eggs and larvae are also called ichthyoplankton. The following sections characterize the plankton of the GOM and the proposed Project area that eventually grow to become free-swimming or benthic fish and invertebrate species.

Commercially important shellfish species on the western Florida shelf include pink shrimp (*Panaeus duorarum*), rock shrimp (*Sicyonia brevierostris*), spiny lobster (*Panulirus argus*), stone crab (*Menippe mercernaria*), blue crab (*Callinectes sapidus*), calico scallop (*Argopecten gibbus*), and squid (*Loligo brevis*). Commercially important fish species on the outer western Florida shelf include round scad (*Decapterus punctuatus*), rough scad (*Trachurus lathami*), and striped mullet (*Mugil cephalus*). On the inner shelf commercially important (as bait fish) species include menhaden (*Brevoortia* spp.), Spanish sardine (*Sardinella aurita*), Atlantic thread herring (*Opisthonema oglinum*), and Atlantic bumper (*Chloroscombrus chrysurus*). Examples of species that are not commercially important across the western Florida shelf are two spot flounder (*Bothus robinsi*), gray flounder (*Etropus rintosus*), and sand perch (*Diplectrum formosum*). Commercially unimportant species that occur on the inner shelf are pigfish (*Orthopristis chrysoptera*) and spotted whiff (*Citharchthys macrops*) (Vargo and Hopkins 1990).

Commercially important shellfish species that occur in western Florida estuaries include pink shrimp. However, planktonic shellfish and benthic invertebrate species include cirripedes (barnacles), echinoderms, gastropods, bivalves, and polychaetes. Commercially important species include anchovies (Family Engraulidae), herrings (Family Clupeidae), and drums (Family Sciaenidae). Striped anchovies (*Anchoa hepsetus*) were more abundant in the lower estuary where salinity is higher, while bay anchovies (*A. mitchili*) were abundant in the upper estuaries where salinity is lower. Anchovies are more abundant during summer months. Atlantic thread herring and menhaden spawn offshore and the larvae are carried into the estuaries. Menhaden are more abundant in the winter and Atlantic thread herring are more abundant in the summer. Sand sea trout (*Cynoscion arenarius*) are abundant throughout the year with peaks in March and October. Spotted sea trout (*C. nebulosus*) are abundant in all seasons but winter with a peak in late spring. These two sea trout are recreationally important drums (Family Sciaenidae). Species of gobies (Family Gobiidae), blennies (Family Bleniidae), and silver perch (*Bairdiella chrysoura*) (Family Sciaenidae) are also examples of species that are not commercially important and occur in western Florida estuaries (Vargo and Hopkins 1990).

Distribution in the Project Area. Research indicates that eggs and yolk-sac larvae are only planktonic for a few days after being spawned, although the exact duration depends on the species. The presence of these life stages is an indication of spawning areas and seasonal spawning migrations of adults (Ditty et al. 1988). Water temperature often triggers spawning and is therefore a major influence on the distribution of larval fish (MMS 2002a). Larval densities are lowest during winter and peak during the summer as indicated by **Table 3.2-8**. Most fish species would be in the Project area in the spring, late spring, and early fall. On the Florida continental shelf, many taxa are present earlier and later compared to the northernmost GOM. Examples include scaled sardine (*Harengula jaguana*) and Atlantic thread herring (*Opisthonema oglinum*) (Ditty et al. 1988).

Ichthyoplankton distribution is also influenced by currents that facilitate ichthyoplankton transport. These hydrographic features include tidal transport, duration of the pelagic period, larval behavior (e.g., diel migration), and larval mortality and growth. Two of the most important hydrographic features in the GOM are the Mississippi River discharge plume and the Loop Current. Researchers hypothesize that ichthyoplankton aggregate at the frontal zone of the Mississippi River, and that the discharge plume might indicate that frontal waters provide feeding and growth opportunities for larvae (MMS 2002b). Evidence indicates that eddies that spin off the loop current transport deepwater fish larvae onto the Florida shelf (Houde et al. 1979).

Daily or diel migrations might result from changes in light intensity, nutrients, and density gradients in the water column (Nybakken 1997). Vertical diel migrations of larvae have been documented for red drum (*Sciaenops ocellatus*), as well as for a wide range of other marine taxa (Helfman et al. 1997). Most commonly, larval fish migrate to lower depths during daytime; however, reverse migrations, where larvae

Table 3.2-8. Monthly and Peak Seasonal Occurrence of Larval Fish (< 10-mm standard length) in the North-Central GOM

Family (common name)	Taxa (common name)	Scientific Name	J	F	M	A	M	J	J	A	S	O	N	D
Herring and Menhaden	Gulf menhaden	*Brevoortia patronus*	*	*	X	X	--	--	--	--	X	X	X	*
	Round herring	*Etrumeus teres*	*	*	*	X	X	X					X	X
	Atlantic thread herring	*Opisthonema oglinum*			X	X	*	*	*	*	X	X	X	
Anchovy	Striped	*Anchoa hepsetus*	X	X	*	*	*	*	*	*	*	X	X	X
	Bay	*Anchoa mitchilli*	X	X	*	*	*	*	*	*	*	X	X	X
	Longnose	*Anchoa nasuta*	X	X	*	*	*	*	*	*	*	X	X	X
Sea Bass and Grouper	Sand perch	*Diplectrum formosum*	X	X	X	X	*	*	*	*	X	X	X	X
	Pygmy sea bass	*Serraniculus pumilio*	--	--	--	--	X	*	*	*	*	X	X	--
Jacks, Scads, Pompanos, and relatives	Blue runner	*Caranx crysos*	--	--	X	X	X	*	*	*	X	X	X	--
	Atlantic bumper	*Chloroscombrus chrysurus*	--	--	--	X	X	*	*	*	*	X	--	--
	Round scad	*Decapterus punctatus*	--	--	X	*	*	*	*	*	*	X	X	--
	Rough scad	*Trachurus lathami*	*	*	X	X	X	--	--	--	--	--	X	X
	Dolphin	*Coryphaena hippurus Linnaeus*	--	--	--	--	X	X	X	X	X	X	X	--
Snapper	Red	*Lutjanus campechanus*	--	--	--	X	X	*	*	*	X	X	X	--
	Gray	*Lutjanus griseus*	--	--	--	X	X	*	*	*	X	X	X	--
	Lane	*Lutjanus synagris*	--	--	--	X	X	*	*	*	X	X	X	--
Mojarras	Pigfish	*Orthopristis chrysoptera*	X	X	*	X	X	--	--	--	--	--	--	--
Porgies	Sheepshead	*Archosargus probatocephalus*	X	*	*	*	X	--	--	--	--	--	--	--
	Pinfish	*Lagodon rhomboides*	*	*	X	X	--	--	--	--	--	X	X	*
Drums, Croakers, Sea Trout	Spotted sea trout	*Cynoscion nebulosus*	--	X	X	*	*	*	*	*	X	X	--	--
	Spot	*Leiostomus xanthurus*	*	X	X	X	--	--	--	--	--	X	X	*
	Atlantic croaker	*Micropogon undulates*	*	X	X	X	--	--	--	--	X	*	*	*
	Red drum	*Sciaenops ocellatus*	--	--	--	--	--	--	--	X	*	*	X	--
Spadefish	Atlantic spadefish	*Chaetodipterus faber*	--	--	--	X	X	*	*	*	X	--	--	--
Mackerels, Tunas, Wahoo	Bullet mackerel	*Auxis rochei*	X	X	X	X	*	*	*	*	*	X	X	--
	Little tunny	*Euthynnus alletteratus*	--	--	--	X	*	*	*	*	*	X	X	--
	Skipjack tuna	*Euthynnus pelamis*	--	--	--	X	X	X	X	X	X	X	--	--
	King mackerel	*Scomberomorus cavalla*	--	--	--	--	X	X	X	*	*	X	X	--
	Spanish mackerel	*Scomberomorus maculatus*	--	--	--	X	X	X	X	*	*	X	--	--
	Bluefin tuna	*Thunnus thynnus*	--	--	--	X	X	X	--	--	--	--	--	--
Butterfish	Gulf butterfish	*Peprilus burti*	*	*	*	X	X	X	X	X	X	X	*	*

Source: Ditty et al. 1988

Notes:

X = Seasonality

* = Peak Seasonal Occurrence

migrate towards the surface during the daytime, have also been documented (Schultz et al. 2003, Lyczkowski-Shultz et al. 1991, Jenkins et al. 1998).

In offshore waters, many ichthyoplankton taxa are collected within specific depth contours. Inshore demersal species, such as Atlantic bumper (*Caranx ruber*) (an important forage species), spotted sea trout (*Cynoscion nebulosus*), pigfish (*Orthopristis chrysoptera*), and black drum (*Pogonias cromis*), are found in water depths shallower than 25 m (82 feet). Several clupeids (herrings) (*Brevoortia patronus*, *Opisthonema oglinum*, and *Sardinella aurita*) and serranids (sea basses) (*Centropristis striata*, *Diplectrum formosum*, and *Serraniculus pumilio*) are found at depths less than 50 m (164 feet). Species collected exclusively at depths of 50 to 200 m (164 to 656 feet) were tuna (*Auxis* sp. and *Euthynnus alletteratus*), blue runner (*Caranx crysos*), round herring (*Etrumeus teres*), red barbier (*Hemanthias vivanus*), red snapper (*Lutjanus campechanus*), king mackerel (*Scomberomorus cavalla*), and rough scad (*Trachurus lathami)*. Wide-ranging epipelagic species, collected in water depths exceeding 150 m (492 feet), include skipjack tuna (*Euthynnus pelamis*), sailfish (*Istiophorus platypterus*), and Atlantic swordfish (*Xiphias gladius*). **Table 3.2-9** presents the primary depth distribution of larvae of some abundant fish species in the northern GOM. Species likely to occur in the Project area are the species distributed in water depths of less than 30 m (100 feet) (Ditty et al. 1988).

Abundance in the Project Area. Plankton survey data are used to characterize the abundance of fish eggs and larvae around the proposed Port Dolphin Terminal. South East Area Monitoring and Assessment Program (SEAMAP) data are used to characterize ichthyoplankton abundance. Plankton surveys have been conducted in the GOM as part of SEAMAP since 1982. Plankton is collected using both neuston nets and bongo nets. The neuston net has a 1-by-2-m (3.28-by-6.56-foot) mouth opening and a mesh size of 0.950 mm. This net is fished at a depth of 0.5 m (1.64 feet) along the surface of the water. Neuston net data cannot be expressed in terms of water volume and were not used for this analysis. The bongo net has a 60-cm (23.6-inch) diameter mouth opening and carries 0.333-mm mesh netting. The bongo net is fitted with a flowmeter that allows the volume of water filtered during the tow to be measured. This net is fished from approximately 1 to 5 m (3.28 to 16.4 feet) off the bottom to the water's surface and yields a sample from the water column that is integrated over depth (i.e., an oblique tow).

The center of the proposed location of the Port Dolphin Buoys is approximately 27.41 degrees (°) latitude and -83.20° longitude. Ichthyoplankton abundance was estimated using SEAMAP bongo net samples (oblique tows taken throughout the water column) between the 36.6-m and 91.4-m (120-foot and 300-foot) isobaths within a rectangle around the proposed location with corners positioned as follows (see **Appendix F** for a detailed explanation of the SEAMAP data analysis):

- Northwest corner: 28.225° latitude/-84.015° longitude
- Northeast corner: 28.225° latitude/-82.385° longitude
- Southwest corner: 26.595° latitude/-84.015° longitude
- Southeast corner: 26.595° latitude/-82.385° longitude.

The larvae in the proposed Port Dolphin deepwater Port samples represent 217 taxa (i.e., larvae identified to the lowest taxon possible). These taxa are presented in **Table 4-1 of Appendix G**. The 10 most abundant taxa, in order of decreasing abundance, are gobies (Family Gobiidae), Spanish sardine (*Sardinella aurita*), round scad (*Decapterus punctatus*), Atlantic thread herring (*Opisthonema oglinum*), lizardfish (Family Synodontidae), scorpionfish (Family Scorpaenidae), unidentified fish, cusk eels (Family Ophidiidae), codfish (*Bregmaceros sp.*), and perch (Order Perciformes).

Table 3.2-9. Primary Depth Distribution of Larval Fish (< 10-mm standard length) in the GOM, North of 26°N Latitude

Common Name	Scientific Name	< 25 m (< 82 feet)[a]	< 50 m (< 164 feet)[a]	< 100 m (< 328 feet)[a]	50–200 m (164–656 feet)[a]	> 150 m (> 492 feet)[a]
Sheepshead	*Archosargus probatocephalus*[b]	X				
Atlantic spadefish	*Chaetodipterus faber*	X				
Atlantic bumper	*Chloroscombrus chrysurus*	X				
Sand sea trout	*Cynoscion arenarius*	X				
Spotted sea trout	*C. nebulosus*[b]	X				
Pigfish	*Orthopristis chrysoptera*	X				
Northern harvestfish	*Peprilus paru*	X				
Black drum	*Pogonias cromis*[b]	X				
Anchovies	*Anchoa* spp.	X	X			
Gulf menhaden	*Brevoortia patronus*[b]	X	X			
Black sea bass	*Centropristis striata*	X	X			
Sand perch	*Diplectrum formosum*	X	X			
Scaled herring	*Harengula jaguana*	X	X			
Pinfish	*Lagodon rhomboides*[b]	X	X			
Spot	*Leiostomus xanthurus*[b]	X	X			
Atlantic croaker	*Micropogonias undulatus*[b]	X	X			
Atlantic thread herring	*Opisthonema oglinum*	X	X			
Round sardine	*Sardinella aurita*	X	X			
Spanish mackerel	*Scomberomorus maculates*	X	X			
Pygmy sea bass	*Serraniculus pumilio*	X	X			
Round scad	*Decapterus punctatus*	X	X	X		
Gulf butterfish	*Peprilus burti*	X	X	X		
Mackerel	*Auxis spp.*				X	
Blue runner	*Caranx crysos*				X	
Round herring	*Etrumeus teres*				X	
Little tunny	*Euthynnus alletteratus*				X	
Red barbier	*Hemanthias vivanus*				X	
Red snapper	*Lutjanus campechanus*				X	
King mackerel	*Scomberomorus cavalla*				X	
Rough scad	*Trachurus lathami*				X	
Skipjack tuna	*Euthynnus pelamis*					X
Sailfish	*Istiophorus* spp.					X
Swordfish	*Xiphias gladius*					X

Source: MMS 2002b

Notes:

a. Depth ranges are those at which more than 75 percent of larvae were collected.

b. Estuarine-dependent species.

X = Seasonality

As presented in **Table 3.2-10**, samples from the Port Dolphin study area indicate that, on average, 3,398 eggs and 12,084 larvae occur per 1 million gallons of seawater. Between 1982 and 1999, 143 sampling trips occurred in the study area. Eggs and larvae were collected on all 143 sampling trips, which occurred during the months of May to November. There were no trips reported with egg samples in 1995. There were no trips with larval samples in 2000. A summary of the sampling trips that caught eggs and larvae is presented in **Appendix G** (see **Table 3.1 in Appendix G**).

Table 3.2-10. Estimate of Egg and Larval Abundance at the Proposed Site for Port Dolphin, Based on SEAMAP Data

Life Stage	Number of Samples	Number of Eggs or Larvae/Million Gallons of Seawater	
		Mean	Standard Error
Eggs	143	3,398	486
Larvae	143	12,084	1,028

Estimates of abundance indicate that the density of larvae is higher than the density of eggs, which is not expected, as fecundity and survival rates of eggs result in fewer numbers of larvae. Limitations of the sampling method, including sampling frequency, could contribute to this. The distribution of fish eggs and larvae depends on spawning behavior of adults, hydrographic structure and transport on a variety of scales (e.g., tidal and current transport and diel migrations), and duration of the egg stage (e.g., for many GOM species only 1 or 2 days). These factors can result in the patchy distribution of eggs and account for a lower egg density than larval density.

Data Limitations and Adjustments. While the estimates of ichthyoplankton abundance are based on the best available data, estimates of population size, distribution, and density are subject to measurement errors and limitations. Measurement errors can result from the inherent patchiness of plankton distribution, too few samples, limitations (bias) of the sampling methods, inconsistent sampling techniques, and different sampling gear. Limitations of the sampling method and sampling gear include a lack of data on the vertical distribution of ichthyoplankton; a lack of data throughout the year and seasons; and sampling gear mesh size that can underestimate smaller eggs, larvae, and zooplankton. Measurement errors can mean that estimates do not accurately reflect the true population size and distribution and are too high or too low. Several attempts were made to account for these sources of uncertainty and variability in the estimates of abundance.

Bongo nets were used to sample plankton data for the SEAMAP survey. The SEAMAP bongo nets have a mesh size of 0.333 mm (0.013 inches). This mesh size could potentially undersample fish eggs and larvae by allowing the smallest larvae to escape the net. For example, a comparison of ichthyoplankton samples taken with 0.333- and 0.202-mm (0.0008-inch) mesh nets indicate the smallest red drum larvae sampled were 5 to 8 times more numerous when collected with the finer mesh net. These results are expected to be applicable to larvae of other species (Lyczkowski-Shultz 2003). To account for this underestimation, the mean, upper, and lower abundances estimated from the SEAMAP and LOOP data are multiplied by 3, resulting in adjusted estimates (Wolff and Wormuth 1984). Oblique tows (i.e., from the bottom to the top of the water column) that are used in the SEAMAP survey provide an estimate of ichthyoplankton that occur throughout the water column. However, oblique tows do not give an indication as to whether densities of ichthyoplankton are stratified or different throughout the water column. Stratified tows would provide information on where an organism is located in the water column (Helfman et al. 1997). It is documented that ichthyoplankton are stratified in deeper waters. However,

sources are unclear as to whether ichtyoplankton are well-mixed in the shallower waters, as in the Project area.

One study indicates that certain species of larvae are found in different locations within the water column (Ditty 1986). The study area was at a water depth of 10 to 12 m (33 to 40 feet). The study made general conclusions about the distribution of larvae species throughout the water column. Most anchovy (Engraulidae) larvae were collected at mid-depth, with some (11 percent) collected at the bottom. From the family Sciaenidae, most Atlantic croaker (*Micropogonias undulatus*) larvae were collected at mid-depth and sand sea trout (*Cynoscion arenarius*) were collected near the bottom. From the family Clupeidae, scaled sardines (*Harengula jaguana*) were collected near the surface, menhaden (*Brevoortia* spp.) were collected at all depths, and Atlantic thread herring (*Opisthonema oglinum*) were collected at mid-depth. From the family Carangidae, Atlantic bumper (*Chloroscombrus chrysurus*) were most abundant near mid-depth. From the family Scombridae, Spanish mackerel (*Scomberomorus maculatus*) were collected at mid-depth (Ditty 1986).

Despite its limitations, the data and methodology used represent the best available data. The sampling period of 17 years captures annual variability that cannot be captured in 1 or 2 years of sampling at the proposed Project site. Additionally, the methodology was developed in conjunction with NMFS Gulf Landing LLC Deepwater Port Application EIS (USCG and MARAD 2004, USCG 2005).

3.2.9 Fish and Fisheries Resources

The northern GOM has traditionally been one of the most productive fishery areas in North America (Gunter 1967). The GOM's marine habitats, ranging from coastal marshes to the deep-sea abyssal plain, support a varied and abundant fish fauna. Coastal pelagic and demersal fish assemblages are recognized within broad habitat classes for the continental shelf and oceanic waters of the GOM. Many species within these two groups are also estuarine dependent, meaning they spend at least some part of their life cycle in estuaries. Other fish can be found in the lower reaches of an estuary, but do not depend on them to complete their life cycle. These are commonly referred to as nondependent marine fish (Moyle and Cech 1996).

Three fish assemblages occur on the western Florida shelf, off the coast of Tampa Bay, offshore, inshore, and northern inshore assemblages. The offshore assemblage is composed of reef fish including porgies (Family Sparidae), grunts (Family Haemulidae), sea basses (Family Serranidae), and snappers (Family Lutjanidae); and coastal pelagic species such as round scad (*Decapturus punctatus*) and round sardine (*Sardinella aurita*). The inshore assemblage is primarily composed of small coastal pelagics including round sardine, Atlantic thread herring (*Opisthonema oglinum*), scaled herring (*Harengula jaguana*), and Atlantic bumper (*Chloroscombrus chrysurus*). The northern inshore assemblage was mostly composed of forage fish such as pinfish (*Lagodon rhomboides*), mojarras (*Eucinostomus* spp.), grass porgies (*Calamus arctifrons*), and spottail pinfish (*Diplodus holbrooki*) (Alevizon and Bannerot 1990). The offshore and inshore assemblages include fish that are both commercially and recreationally important. The inshore and northern inshore assemblages are ecologically important as forage or prey species.

Coastal Pelagic Fish. Coastal pelagic fish inhabit the continental shelf waters of the GOM throughout the year. The major coastal pelagic fish in the GOM include requiem sharks, ladyfish, anchovies, herrings, mackerels and tunas, jacks, mullet, bluefish, and cobia. Some species form large schools (e.g., Spanish mackerel), while others travel independently or in smaller groups (e.g., cobia). Gulf menhaden and bay anchovies are examples of coastal pelagic fish that are estuarine-dependent. Coastal pelagic fish that can be found in the lower reaches of an estuary, but do not depend on them to complete their life cycle, include Spanish mackerel, cobia, dolphin, and bluefish.

Coastal pelagic fish can be divided into two ecological groups: predators and planktivores. The predators include species such as king and Spanish mackerels, bluefish, cobia, dolphin, jacks, and little tunny. These species typically undergo migrations, grow rapidly, mature early, and exhibit high fecundity. Some large predator species (particularly bluefish, Spanish mackerel, and blue runner) might be attracted to large concentrations of anchovies, herrings, and silversides that congregate in nearshore areas. The planktivores have similar life history characteristics, but the species are smaller in body size. This group includes Gulf menhaden, Atlantic thread herring, Spanish sardine, round scad, and anchovies (MMS 1999, MMS 2002a).

Demersal Fish. Bottom-oriented or demersal fish and other demersal fauna of the GOM are characterized by substrate composition and water depth (Gallaway 1981). Demersal fish species would be expected to inhabit hard-bottom habitats, soft sediments, and seagrass beds. Dominant fish species identified in historical surveys on the western Florida shelf include left eye flounders (Family Bothidae), grunts (Family Haemulidae), eagle rays (Family Myliobatidae), drums (Family Sciaenidae), sea basses (Family Serranidae), and porgies (Family Sparidae) (Alevizon and Bannerot 1990). Demersal fish that are considered estuarine-dependent include red drum, gag grouper, gray snapper, and lane snapper. Red snapper is an example of a demersal fish that can be found in the lower reaches of an estuary, but does not depend on them to complete their life cycle.

Hearing Capabilities. Hearing sensitivity is known for approximately 100 of the 250,000 extant species of fish (NRC 2003). The hearing sensitivity of fish ranges from 0.5 to 200 kHz; however, most fish detect sound within 0.5 to 1 kHz (NRC 2003). It has been reported that clupeid fish, such as Gulf menhaden (*Clupea harengus*) and American shad (*Alosa sapidissima*), respond to frequencies as high as 180 kHz, with thresholds for American shad around 155 dB sound pressure level (SPL) and for Gulf menhaden around 180 dB SPL (Mann et al. 2001). These species can also hear within lower frequencies (below 10 kHz), with thresholds being around 120 to 130 dB SPL. Some known hearing sensitivities for fish are presented in **Table 3.2-11**.

3.2.9.1 Federally Managed Fish and Shellfish Species

Commercial and recreational fisheries resources in Federal waters of the GOM are managed by the GMFMC and NMFS. The GMFMC is one of eight regional FMCs established by the MSA. FMPs developed by the GMFMC include the following:

- Shrimp Fishery of the GOM, U.S. waters
- Red Drum Fishery of the GOM
- Reef Fish of the GOM
- Coastal Migratory Pelagic Resources (Mackerels) in the GOM
- Stone Crab Fishery of the GOM and South Atlantic
- Spiny Lobster in the GOM and South Atlantic
- Coral and Coral Reefs of the GOM.

Secretarial FMPs have been developed by NMFS for highly migratory species and include Amendment 1 to the Atlantic Billfish FMP; Final FMP for Atlantic Tuna, Swordfish, and Sharks; and the Final Consolidated Atlantic Highly Migratory Species FMP (NMFS 1999a, NMFS 2006a, NMFS 1999b).

Table 3.2-11. Reported Hearing Sensitivities of Marine Fish

Order	Description of Order	Common Name	Scientific Name	Hearing Range (kHz)
Perciformes *	Tunas (Scombridae)	Yellowfin	*Thunnus albacores*	0.05–1.1 (best hearing from 0.3–0.5)
		Kawakawa	*Euthynnus affini*	0.05–1.1 not as sensitive as *Thunnus albacares*
	Damselfish (Pomacentridae)	Various species	*Eupomacentrus* spp.	0.1–1.2 (best hearing from 0.3–0.6)
		Goby	*Gobius niger*	0.1–0.16
		Perch	*Perca fluviatilis*	0.1–0.16
		Pike perch	*Lucioperca Sandra*	0.1–0.16
	Serranidae (Sea basses)	Red hind	*Epinephalus guttatus*	0.1–1 (best hearing from 0.2–0.4)
	Snappers	Schoolmaster	*Lutjanus apodus*	0.1–1 (best hearing from 0.2–0.6)
	Drums and croakers (Sciaenidae)	Chubbyu	*Equetus acuminatus*	0.1–2 (best hearing from 0.2–1)
	Grunts (Haemulidae)	Blue-striped grunt	*Haemulon sciurus*	0.75–1.0 (best hearing from 0.75–0.8)
	Wrasses (Labridae)	Blue-head wrasse	*Thalossoma birasciatum*	0.1–1.2 (best hearing from 0.2–0.4)
		Tautog	*Tautoga onitis*	0.1–0.16
Batrachoidformes	Toadfish	Oyster toadfish	*Opsanuss tau*	0.1–0.16
Scorpaeniformes	Searobins	Slender searobin	*Prionotus scitulus*	0.1–0.6 (best hearing from 0.3–0.4)
Pleuronectiformes	Flounders, sole, halibut	Plaice	*Pleuronectes platessa*	0.03–0.2
		Dab	*Limanda limanda*	0.1–0.2
Anguilliformes	Eels	American eel	*Anguilla anguilla*	up to 0.3
Abuleiformes	Bonefish	Bonefish	*Abula vulpes*	0.05–0.7
Salmoniformes	Salmon, trout, char	Atlantic salmon	*Salmo salar*	0.03–0.4

Order	Description of Order	Common Name	Scientific Name	Hearing Range (kHz)
Gadiformes	Cods, hakes, haddock, pollock	Atlantic cod	*Gadus morhua*	0.01–0.5
		Haddock	*Melanogrammus aegelfinus*	0.03–0.47
		Pollock	*Pollachius pollachius*	0.03–0.47
		Ling	*Molva molva*	0.04–0.55
Siluriformes	Fresh water catfish	Fresh water catfish	*Ictalurus nebulosus*	0.05–3+
Cypriniformes	Minnows, suckers, carp	Goldfish	*Carassius auratus*	
		Chub	*Semotilus atromaculatus*	
		Japanese carp	*Cyprinus carpio*	
Beryciformes	Squirrelfish		*Myripristis kuntee*	0.1–3 (best hearing from 0.3–2)
			Holocentrus ascencionis	0.3–2
			Holocentris vexillaris	0.1–1.2
			Adioryx xantherythrus	1
Clupeiformes	Herrings, shads, sardines, and anchovies	American shad	*Alosa sapidissima*	10–180+
		Blueback herring	*Alosa aestivalis*	200+
		Herring	*Clupea harengus*	0.03–4 (best hearing from 0.3–1)
		Gulf menhaden	*Brevoortia patronus*	10–180+
		Sardines and anchovies	*Harengula* sp., *Anchoa* sp., *Sardinella* sp.	< 4
Acipenseriformes	Sturgeon	Lake sturgeon	*Acipenser fulvescens*	0.1–2 (best hearing at 0.1– 0.4)
Heterodontiformes	Bullhead sharks	Horn shark	*Heterdontus francisci*	0.02–0.16
Carcharhiniformes	Ground sharks	Bull shark	*Carcharhinu leucas*	0.4–0.6

Sources: NPS 2003, NRC 2003, Mann et al. 2001, Plachta and Popper 2003, Tavolga et al. 1981, Mann et al. 1998, Meyer and Popper 2002

Note: * Perciformes is such a diverse group of fish that they are broken down by taxonomic family.

3.2.9.2 Essential Fish Habitat

EFH has been designated for shrimp, red drum, reef fish, coastal migratory pelagic species, stone crabs, spiny lobster, and coral in the GOM by the GMFMC in the *Generic Amendment Number 3 for Addressing Essential Fish Habitat Requirements, Habitat Areas of Particular Concern, and Adverse Effects of*

Fishing (GMFMC 2005). EFH consists of the following waters and substrate areas in the GOM (GMFMC 2005):

- Red Drum FMP: All estuaries; Vermilion Bay, Louisiana, to the eastern edge of Mobile Bay, Alabama, out to depths of 25 fathoms; Crystal River, Florida, to Naples, Florida, between depths of 5 and 10 fathoms; and Cape Sable, Florida, to the boundary between the areas covered by the GMFMC and the South Atlantic Fishery Management Council (SAFMC) between depths of 5 and 10 fathoms (GMFMC 2005). Early life history stages of red drum are pelagic, while juvenile and adult red drum are found over a variety of salinities including habitats such as seagrass, sand, mud, and oyster reefs (GMFMC 2004).
- Reef Fish and Coastal Migratory Pelagic Species FMPs: All estuaries; the U.S./Mexico international border to the boundary between the areas covered by the GMFMC and the SAFMC from estuarine waters out to depths of 100 fathoms (GMFMC 2005). Early life history stages of most reef fish are considered pelagic, while juvenile and adult life stages are considered demersal and associated with structure. All life history stages of most coastal migratory pelagic species would be considered pelagic (GMFMC 2004).
- Shrimp FMP: All estuaries; the U.S./Mexico international border to Fort Walton Beach, Florida, from estuarine waters out to depths of 100 fathoms; Grand Isle, Louisiana, to Pensacola Bay, Florida, between depths of 100 and 325 fathoms; Pensacola Bay, Florida, to the boundary between the areas covered by the GMFMC and the SAFMC out to depths of 35 fathoms, with the exception of waters extending from Crystal River, Florida, to Naples, Florida, between depths of 10 and 25 fathoms and in Florida Bay between depths of 5 and 10 fathoms (GMFMC 2005). The egg, juvenile, and adult life history stages of shrimp are considered demersal, while the larval stages are considered pelagic (GMFMC 2004).
- Stone Crab FMP: All estuaries; the U.S./Mexico international border to Sanibel, Florida, from estuarine waters out to depths of 10 fathoms; and from Sanibel, Florida, to the boundary between the areas covered by the GMFMC and the SAFMC from estuarine waters out to depths of 15 fathoms (GMFMC 2005). Stone crab eggs are carried under the female's abdomen. Stone crab larvae are pelagic, while juvenile and adult stone crabs are benthic. Juvenile stone crabs are associated with shell bottom, sponges, sargassum mats, channels, and deep flats. Adult stone crabs are associated with burrows, rock ledges, coral heads, dead shells, and seagrass patches (GMFMC 2004).
- Spiny Lobster FMP: From Tarpon Springs, Florida, to Naples, Florida, between depths of 5 and 10 fathoms; and Cape Sable, Florida, to the boundary between the areas covered by the GMFMC and the SAFMC out to depths of 15 fathoms (GMFMC 2005). Spiny lobster larvae are pelagic and require optimal temperature and salinity and low levels of suspended sediments and pollutants. The principal habitat used by juvenile and adult spiny lobster is offshore coral reefs. Spiny lobsters spawn in offshore waters in the deeper reef fringes (GMFMC 2004).
- Coral FMP: The total distribution of coral species and life stages throughout the GOM including coral reefs in the North and South Tortugas Ecological Reserves, East and West Flower Garden Banks, McGrail Bank, and the southern portion of Pulley Ridge; hard-bottom areas scattered along the pinnacles and banks from Texas to Mississippi, at the shelf edge and at the Florida Middle Grounds, the southwestern tip of the Florida reef tract, and predominant patchy hard bottom offshore of Florida from approximately Crystal River south to the Florida Keys (GMFMC 2005). Corals are broadcast spawners and larval corals are pelagic. Corals occupy limestone outcroppings on the western shelf of Florida (GMFMC 2004).

EFH occurs in the proposed Project area for all of the species managed by the GMFMC. EFH for reef fish, coastal migratory pelagic species, and corals occurs in the area of the proposed buoy array. EFH for red drum, reef fish, coastal migratory pelagic species, shrimp, stone crabs, and spiny lobster occurs along the pipeline route. No Habitat Areas of Particular Concern occur in the proposed Project area (GMFMC 2005).

EFH for highly migratory species is described the *Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan* (NMFS 2006a). EFH occurs in the area of the proposed buoy array and along the pipeline route for larval bluefin tuna, adult great hammerhead, juvenile and adult nurse sharks, blacktip shark (all life stages), bull shark (all life stages), juvenile and adult lemon sharks, sandbar sharks (all life stages), neonate spinner sharks, juvenile tiger sharks, juvenile bonnethead sharks, and blacknose sharks (all life stages) (NMFS 2006a). Larval bluefin tuna are pelagic. Adult great hammerheads are found in open ocean and shallow coastal waters. Juvenile and adult nurse sharks, sandbar sharks, neonate spinner sharks, juvenile tiger sharks, blacktip sharks, and blacknose sharks inhabit shallow coastal waters. Lemon sharks, bull sharks, and juvenile bonnethead sharks inhabit shallow coastal waters, inlets, and estuaries (NMFS 2006a).

Appendix G contains detailed descriptions of EFH, including predator prey relationships, for species that have EFH designated within the Project area.

3.2.10 Terrestrial Resources

The onshore proposed pipeline project site begins at the pier bulkhead at Port Manatee and terminates at the Gulfstream/TECO interconnection station. The description of existing conditions is based on surveys conducted specifically for this Project.

3.2.10.1 Wetlands

Wetlands play a critical role in the global water, nitrogen, and sulfur cycles. Wetlands are integral in the development of organisms that form the base of the food web and feed many species. They provide habitat for species of fish, amphibians, shellfish, and insects that rely on wetlands for food, water, and shelter, especially during migration and breeding. Furthermore, wetlands provide valuable ecosystem functions such as water filtration and storage.

For regulatory purposes under the CWA, the term wetlands means “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas” (40 CFR 230.3[t]). Wetlands are characterized by plants (hydrophytes), soils (hydric soils), and frequency of flooding. The FERC also defines wetlands as any area that is not actively cultivated or rotated cropland and that satisfies the requirements on the current methodology for identifying and delineating wetlands.

The wetlands observed on the site can be primarily categorized into four classifications: (1) open water, (2) scrub-shrub, (3) emergent, and (4) forested. These classifications include both palustrine (fresh water) and estuarine (saltwater) sites (Cowardin et al. 1979). Many of the wetland sites could not be identified by a single plant community classification; therefore, a combination of appropriate classifications was applied, with the dominant site characteristics listed first. The remaining classifications listed are sites with open water, river, or other deepwater habitats identified as the primary site characteristic (Port Dolphin 2007b). Photographs of the wetlands crossed by the pipeline appear in **Appendix E** (see **Section 7 of Appendix E**).

Estuarine Open Water/Scrub-Shrub. Estuarine open water includes coastal canals that have little vegetation and the surface water supports estuarine fish and wildlife species. Estuarine scrub-shrub wetlands are coastal marshes periodically flooded by tidal waters. The tidal flushing is an important characteristic providing the wetland with mixing of soils, seed banks, and nutrients. The estuarine open-water habitat includes the tidal canal in Port Manatee. This canal contains a few small red mangroves (*Rhizophora mangle*) along the banks. Due to the presence of two different habitats, this wetland is listed as a combination of both open-water and scrub-shrub classification.

Palustrine Forested. Palustrine forested habitats are characterized by sites containing woody vegetation at least 6 m (20 feet) tall. All water regimes are included except subtidal. Due to the presence of Brazilian pepper (*Schinus terebinthifolius*) trees throughout the majority of wetland sites, no wetland was classified as only forested (Port Dolphin 2007b).

Palustrine Scrub-Shrub. Scrub-shrub wetlands are dominated by woody vegetative species. Scrub-shrub wetlands are similar to forested wetlands in species composition; however, they have a reduced forested component or immature tree species, leading to vegetation less than 6 m (20 feet) in height.

Palustrine Emergent. Emergent wetlands are dominated by herbaceous vegetation exhibiting stems that are erect, rooted, and soft. Emergent wetlands can show a diverse variety of nonwoody species including grasses, sedges, or other emergent hydrophytes. Periodic nontidal flooding can occur, leaving wetland soils saturated or inundated.

The number of wetlands along the proposed pipeline initially identified in the Draft EIS route has been reduced from 11 to 9 due to development in the area, unrelated to this Project, and a refined definition of jurisdictional wetlands. It is important to note that Wetland W-5 was recently disturbed and filled (as of May 13, 2008). No portion of this wetland remains in the Project area. Additionally, the FPL borrow pond was originally delineated as Wetland W-4, but according to both the State and Federal rules, a borrow pond constructed in upland habitat is not jurisdictional. The borrow pond is considered to be a waterbody and would be crossed as such according to the FERC Procedures. Therefore, both Wetlands W-4 and W-5 are no longer included in the identified wetlands along the pipeline route. For clarity, the complete discussion of the existing environment is included below.

NWI and Florida Land Use, Cover, and Classification System (FLUCCS) maps were reviewed to determine the potential presence of wetland habitats within the pipeline Project area. NWI or FLUCCS maps indicated that nine wetlands were present along the corridor Field surveys were conducted to verify NWI and FLUCCS classifications. Wetlands were reclassified, as appropriate, based on current condition determined during the field survey. Wetlands were classified in accordance with the Wetlands and Deepwater Habitat Classification System provided by NWI and FLUCCS code.

Wetlands surveys were conducted over most of the onshore proposed Port Dolphin Project area. Certain parcels were not delineated due to denial of ROW access; these areas were assessed via aerial interpretation and ground-truthing conducted from the adjacent FPL ROW areas. Field surveys were conducted along the proposed pipeline route to identify and delineate State and Federal jurisdictional wetlands. The basis for wetlands delineations was obtained from the 1987 USACE Wetland Delineation Manual and Florida State Rule 62-340, F.A.C.

3.2.10.2 Vegetation

Plant communities found along the proposed onshore route are dominated by disturbed and ruderal sites; however, a variety of habitat types would be traversed. The proposed pipeline route would be located parallel to and cross large sections of existing ROWs, roadways, excavated sites, and drainage canals.

Due to previous disturbances, nuisance and exotic species have spread into these areas. Brazilian pepper, specifically, has become the dominant species throughout the majority of the sites, including wetlands, within the proposed pipeline route (Port Dolphin 2007b).

Other nonwetland sites along the proposed pipeline corridor include industrial sites, such as Port Manatee, railroad and transportation ROWs, agricultural fields, maintained grass fields, and previous mining land. Many of these sites have reduced or no vegetation due to the respective land uses or maintenance activities (Port Dolphin 2007b).

Small areas of upland forest exist on either side of U.S. Highway 41. The area immediately west of U.S. Highway 41 contains temperate hardwood components including live oak (*Quercus virginiana*), Southern red cedar (*Juniperus virginiana*), hackberry (*Celtis occidentalis*), and cabbage palm (*Sabal palmetto*). The area immediately east of U.S. Highway 41 is composed primarily of Australian pine (*Casuarina equisetifolia*) (Port Dolphin 2007b).

The wetlands sites have the greatest abundance of vegetation along the proposed pipeline route. A number of wetland types would be traversed including exotic wetland hardwood, wetland scrub, vegetated nonforested wetlands, and fresh water marsh wetlands. Many of these wetland sites have been subjected to disturbances from adjacent conditions and an influx of nuisance/nonnative species (Port Dolphin 2007b).

Nonnative wetland hardwoods and mixed wetland forests are present along the pipeline route (Wetlands 2 and 3). The interior portions of these habitats contain thick tangles of Brazilian pepper, while the outer edges contain a mixture of forested and herbaceous species. Forested species include red maple (*Acer rubrum*), cabbage palms, swamp tupelo (*Nyssa sylvatica*), and live oak. Ground cover and herbaceous species include leather fern (*Acrostichum danaeifolium*), Virginia chain fern (*Woodwardia virginica*), saw palmetto (*Serena repens*), switch grass (*Panicum virgatum*), elephant grass (*Pennisetum purpureum*), beggar tick (*Bidens alba*), frog fruit (*Phyla nodiflora*), and saltmarsh aster (*Aster subulatus*) (Port Dolphin 2007b).

The vegetated nonforested wetlands and fresh water marshes are located on the eastern portion of the pipeline. True forested components are absent in these wetlands. Wetland 6 is a man-made ditch most likely created for the adjacent agricultural fields. This ditch is dominated by blue maidencane (*Amphicarpum muhlenbergianum*) and leads into a Brazilian pepper forest (Port Dolphin 2007b).

The middle section of Wetland 8 contains a fresh water scrub-shrub habitat dominated by nonnative species that includes primrose willow (*Ludwigia peruviana*). Wetland 9 contains a fresh water component within and adjacent to the extractive land use area. This area was heavily disturbed due to past sand mining activities. This disturbance has caused an influx of cattail (*Typha* sp.) along the reservoir banks. Other species found in these wetland habitats include primrose willow, flat sedge (*Cyperus* spp.), beggar tick, bushy bluestem (*Andropogon glomeratus*), saltbush (*Baccharis hamilifolia*), Brazilian pepper, Caesar weed (*Urena lobata*), dog fennel (*Eupatorium capillifolium*), foxtail (*Setaria geniculata*), Carolina willow (*Salix caroliniana*), frog fruit, maidencane (*Panicum hemitomon*), soft rush (*Juncus effusus*), rosey camphorweed (*Pluchea rosea*), and Bermuda grass (*Cynodon dactylon*) (Port Dolphin 2007b).

A mangrove swamp is adjacent to the proposed route in Port Manatee. Mangroves do exist adjacent to the pipeline route, on the southern bank of the tidally influenced canal (south conveyance ditch) within Port Manatee. Red, black (*Avicennia germinans*), and white (*Laguncularia racemosa*) mangroves are found within the site. The banks of the canal also contain grass and herbaceous species such as saltgrass

(*Distichlis spicata*), samphire (*Blutaparon vermicluane*), golden rod (*Solidago* sp.), cattail, saltbush, and frog-fruit (Port Dolphin 2007b).

Table 3.2-12 provides a list of vegetation species observed along the proposed onshore route.

3.2.10.3 Wildlife

Potential fishery resources in the terrestrial portion of the Project include a brackish tidally influenced canal adjacent to the mangroves, a small creek (Curiosity Creek), drainage ditches, multiple open water reservoirs, and seasonally flooded wetland sites. The brackish tidally influenced canal is located in Port Manatee (southern conveyance ditch). The canal is a shallow, man-made canal that connects to Tampa Bay to the west and culverted drainage ditches to the east. In the western section of the canal, little vegetation is present. However, the canal parallels a mangrove swamp and further east contains small mangrove trees along the banks. The eastern section of the canal appears to have a lower salinity, and fresh water wetland species such as cattails are present along the banks. This canal can support juvenile estuarine fish species such as those in the Snapper-Grouper complex that can tolerate lower salinities. Fish in the Snapper-Grouper complex are known to be important commercial and recreational fish species (Myers and Ewel 1990).

Many drainage ditches along the proposed pipeline route had standing water at the time of the field investigation; however, no aquatic life was observed. There is, however, the potential for the presence of mosquitofish (*Gambusia affinis*). The reservoirs present along the pipeline route are previously excavated sites and fish were observed during the field investigation (Port Dolphin 2007b).

The tidally influenced canal (south conveyance ditch) contained the largest volume of water. A variety of fish species and invertebrates were observed within the canal. The canal has the potential to sustain fishery resources due to the connectivity to the GOM and close proximity to the mangrove wetlands (Port Dolphin 2007b).

The areas of potentially greater wildlife utilization are the wetland sites. The adjacent mangrove wetland provides habitat for wading birds, fish, invertebrates, amphibians, and reptiles. The emergent wetlands provide foraging opportunities for small mammals and wading birds, while the open water areas provide habitat for invertebrates, reptiles, and amphibians. The storm water ditches and open water sites provide habitat that would most likely be utilized by a variety of aquatic animals and bird species. The forested sites also provide foraging opportunities for larger mammals, birds, and reptiles. Wildlife can also utilize these sites for shelter, roosting, and nesting in the canopy and subcanopy stratums (Myers and Ewel 1990).

Most of the remainder of the proposed pipeline corridor consists of disturbed lands. The proposed pipeline corridor traverses Port Manatee, along cropland and pastureland, across industrial land, under railroad and road easements, across recreation land, and across extractive land. These areas would have minimal wildlife use due to the lack of shelter, foraging ground, and increased human interaction. Wildlife expected to use these areas are raccoons (*Procyon lotor*), striped skunk (*Mephitis mephitis*), wild pigs (*Sus scrofa*), armadillo (*Dasypus novemcinctus*), and various reptiles and birds (Myers and Ewel 1990).

Table 3.2-13 provides the habitat types and representative wildlife species along the proposed onshore route.

Table 3.2-12. Vegetation Species Found Along the Proposed Onshore Route

Common Name	Scientific Name
Saltbush	*Baccharis hamilifolia*
Live oak	*Quercus virginiana*
Southern red cedar	*Juniperus salicicola*
Hackberry	*Celtis occidentalis*
Red maple	*Acer rubrum*
Swamp tupelo	*Nyssa sylvatica*
Brazilian pepper*	*Schinus terebinthifolius*
Australian pine*	*Casuarina equisetifolia L.*
Red mangrove	*Rhizophora mangle*
Black mangrove	*Avicennia germinans*
White mangrove	*Laguncularia racemosa*
Cabbage palm	*Sabal palmetto*
Saw palmetto	*Serena repens*
Primrose willow*	*Ludwigia peruviana*
Carolina willow	*Salix caroliniana*
Beggar tick	*Bidens alba*
Castor bean*	*Ricinus communis*
Air potato*	*Dioscorea bulbifera*
Cattail*	*Typha* sp.
Caesar weed*	*Urena lobata*
Dog fennel	*Eupatorium capillifolium*
Foxtail	*Setaria geniculata*
Rosey camphorweed	*Pluchea rosea*
Climbing cassia*	*Senna pendula*
Erect sword fern*	*Nephrolepis cordifolia*
Giant brake fern*	*Pteris tripartita*
Leather fern	*Acrostichum danaeifolium*
Virginia chain fern	*Woodwardia virginica*
Bahia grass*	*Paspalum notatum*
Torpedo grass*	*Panicum repens*
Vasey's grass*	*Paspalum urvillei*
Bermuda grass*	*Cynodon dactylon*
Switch grass	*Panicum virgatum*
Flat sedge	*Cyperus* spp.
Soft rush	*Juncus effusus*
Elephant grass	*Pennisetum purpureum*
Maidencane	*Panicum hemitomon*
Blue maidencane	*Amphicarpum muhlenbergianum*
Golden rod	*Solidago* sp.
Samphire	*Blutaparon vermicluane*
Saltgrass	*Distichlis spicata*
Frog fruit	*Phyla nodiflora*
Saltmarsh aster	*Aster subulatus*
Bushy bluestem	*Andropogon glomeratus*

Source: Port Dolphin 2007b

Note: * Invasive and or nonnative species.

Table 3.2-13. Habitat Types and Representative Wildlife Species Found Along the Proposed Onshore Route

Habitat Type	Common Name	Scientific Name
Open Water and Wetlands	White ibis	*Eudocimus albus*
	Osprey	*Pandion haliaetus*
	Bald eagle	*Haliaeetus leucocephalus*
	Brown pelican	*Pelecanus occidentalis*
	Wood stork	*Mycteria americana*
	Cormorant	*Phalacrocorax auritus*
	Great egret	*Ardea alba*
	Snowy egret	*Egretta thula*
	Roseate spoonbill	*Platalea ajaja*
	Little blue heron	*Egretta caerulea*
	Black-crowned night heron	*Nycticorax nycticorax*
	Great blue heron	*Ardea herodias*
	Mangrove tree crab	*Aratus pisonii*
	Sand fiddler crab	*Uca pugilator*
	Mangrove salt marsh snake	*Nerodia fasciata compressicuada*
	Raccoon	*Procyon lotor*
	Striped skunk	*Mephitis mephitis*
	River otter	*Lutra Canadensis*
	White ibis	*Eudocimus albus*
	Least bittern	*Ixobrychus exilis*
	American coot	*Fulica Americana*
	Green-backed heron	*Butorides striatus*
	Marsh wren	*Cistothorus palustris*
	Red-winged blackbird	*Agelaius phoeniceus*
	Wood stork	*Mycteria americana*
	Great blue heron	*Ardea herodias*
	Green tree frog	*Rana castebeiana*
	Cuban tree frog	*Osteopilus septentrionalis*
	Various frogs	*Rana* spp.
	American alligator	*Alligator mississippiensis*
	Cottonmouth	*Seminatrix pygaea*
	Mosquitofish	*Gambusia affinis*
Upland Forest	Black racer	*Coluber constrictor*
	American crow	*Corvus brachvrhvnchos*
	Nine-banded armadillo	*Dasypus novemcinctus*
	Red rat snake	*Elaphe guttata guttata*
	Striped skunk	*Mephitis mephitis*
	Raccoon	*Procyon lotor*
	Ground skink	*Scincella lateralis*
	Gray squirrel	*Sciurus carolinensis*
	Wild boar	*Sus scrofa*

Habitat Type	Common Name	Scientific Name
Disturbed	Florida box turtle	*Terrapene carolina bauri*
	Green anole	*Anolis carolinensis*
	Brown anole	*Anolis sagrei*
	Southern toad	*Bufo terrestris*
	Green tree frog	*Rana castebeiana*
	Cuban tree frog	*Osteopilus septentrionalis*
	Bobcat	*Lynx rufus*
	Eastern cottontail rabbit	*Sylvilagus floridanus*
	Raccoon	*Procyon lotor*
	Striped skunk	*Mephitis mephitis*
	White-tailed deer	*Odecoileus virginianus*

Sources: FNAI 2007, Port Dolphin 2007l, Myers and Ewel 1990

3.2.10.4 Threatened and Endangered Species

Threatened and endangered species or species of special concern have been observed in the Project area. During the field investigations conducted by the Applicant, a snowy egret (*Egretta thula*) and American alligator (*Alligator mississippiensis)* were observed at the open water (reservoir) site. During the field survey of the tidally influenced canal (south conveyance ditch) and adjacent mangrove site, multiple tricolored herons (*Egretta tricolor*), wood storks (*Mycteria americana*), an American kestrel (*Falco sparverius*), and an American alligator were observed. A wildlife survey conducted by the Applicant indicated the presence of a gopher tortoise on the property where the interconnection station would be located. Prior to initiation of construction, additional wildlife surveys would be completed to determine if the gopher tortoise is present. If the gopher tortoise is present, the Applicant would initiate coordination with Florida Fish and Wildlife Conservation Commission (FWC). Coordination with the FWC would determine if an additional survey is necessary to confirm the presence of the gopher tortoise (a state species of special concern) and the southeastern American kestrel (a state threatened species) within the proposed onshore pipeline route.

Additional surveys were performed to investigate the presence or absence of suspected threatened and endangered species. Species-specific surveys were conducted from May 13 to 17, 2008, for state and federally listed species. The surveys were conducted to address the potential presence of southeastern American kestrel (*Falco sparverius paulus*), gopher tortoise (*Gopherus polyphemus*), Florida scrub jay (*Amphelecoma coerulescens*), and listed wading birds within potential habitats for these species along the proposed pipeline corridor. The species-specific survey for scrub jays was performed utilizing the standard protocols as outlined by the USFWS and the FWC. No scrub jays or evidence of presence of the species were observed. Pedestrian transects were surveyed along the length of the ROW for highly visible species such as alligators and wading birds. Any species observed during the survey was noted and the location marked with a Global Positioning System (GPS) unit.

State- and federally listed threatened, endangered, and species of special concern that can be found either within or adjacent to the onshore Port Dolphin pipeline area, based on habitat types, are presented in **Table 3.2-14**. State- and federally listed species present in Manatee County that are not present in the Project area are not included in **Table 3.2-14**. This species listing was developed based on a search of the FNAI tracking list for Manatee County for protected species observed and the beta-test version of the FWC's wildlife tool.

Table 3.2-14. State and Federally Listed Species Potentially Occurring in the Proposed Onshore Route

Common Name	Scientific Name	Federal Status	State Status	Habitat
Mammals				
Florida mouse	*Peromyscus floridanus*		SSC	Fire-maintained, xeric, upland vegetation occurring drier pine flatwoods that are not present
Birds				
Audubon's crested caracara	*Caracara cheriway*	T	T	Open lands, pastureland, arid and moist habitats
Brown pelican	*Pelecanus occidentalis*		SSC	Mangroves
Florida burrowing owl	*Speotyto cunicularia floridana*		SSC	Open, well-drained areas with herbaceous ground cover
Little blue heron	*Egretta caerulea*		SSC	Shallow fresh water, brackish and saltwater environments
Peregrine falcon	*Falco peregrinis*		E	Prairies, coastal ponds, marshes, and urban areas
Roseate spoonbill	*Platalea ajaja*		SSC	Mangroves
Snowy egret	*Egretta thula*		SSC	Coastal and inland wetlands, mangroves
Southeastern American kestrel	*Falco sparverius paulus*		T	Open fields, forest edges, and marshes; require perching apparatus
Tricolor heron	*Egretta tricolor*		SSC	Mangroves and willow thickets
White ibis	*Eudocimus albus*		SSC	Fresh water, brackish, and saline environments
Wood stork	*Mycteria americana*	E	E	Wetlands and other waterbodies
Reptiles				
American alligator	*Alligator mississippiensis*		SSC	Water-retaining habitats
Eastern indigo snake	*Dymarchon corais couperi*	T	T	Dry habitats bordered by water
Gopher tortoise	*Gopherus polyphemus*		SSC	Sandy, open scrub habitats
Amphibians				
Florida gopher frog	*Rana capito*		SSC	Sandy scrub wet areas

Source: USFWS 2007a, FNAI 2007, Rogers et al. 1996, Ashton and Ashton 1981

Notes: T = Threatened; E = Endangered; SSC = Species of Special Concern

Southeastern American Kestrel. The kestrel is the smallest and most common of the falcons. The back and tail of the kestrel are russet, the wings blue-gray. Two lines of onyx tears mark the sides of its white face. Two subspecies of American kestrel (*Falco sparverius*) occur in Florida: a northern subspecies (*Falco sparverius sparverius*) that winters between September and April; and a resident, nonmigratory subspecies, the southeastern American kestrel (*Falco sparverius paulus*), which is listed as state threatened. Kestrels seen in Florida during May through June are resident southeastern American kestrels (FWC 2007e).

American kestrels often perch on telephone wires at the edge of a field or other open area. From this vantage point they hunt for insects (especially grasshoppers and dragonflies), lizards, and small mammals. Sometimes they can be seen hovering like helicopters above their prey (FWC 2007e). American kestrels nest in cavities that they do not excavate. Instead, they must depend on woodpeckers and natural processes to create holes in trees. Kestrels nest predominantly in dead but standing longleaf pine trees, called snags, usually in the abandoned cavities of pileated woodpeckers (*Dryocopus pileatus*). Kestrels nest between mid-March and early June, raising about four chicks during a season (FWC 2007e).

Several songbirds such as mockingbirds and red-winged blackbirds were observed during the spring follow-up survey, but no kestrel was noted during any of the investigations. As a result, it can be concluded that the unidentified kestrel observed during the November 2007 survey was an American kestrel, which is not protected in Florida.

Audubon's Crested Caracara. The caracara is a large, long-legged, hawklike bird that is often seen on the ground. It is a scavenger and has a varied diet and often seen eating fresh kills or carrion with vultures. Caracaras are found in open grassland habitats such as dry prairies and improved rangeland. Breeding is from January through March. The nest is bulky and constructed of slender vines and sticks and is usually found in a cabbage palm (Farrand and Bull 1994).

Florida Burrowing Owl. These small birds (9 inches tall) spend the majority of their time on the ground or perched near its burrow. Burrowing owls use burrows year-round; for roosting during the winter and for raising young during the breeding season (February to July). Eggs are primarily laid in March but nesting can occur from October through May. Florida's owls typically dig their own burrows but would use gopher tortoise or armadillo burrows. Burrows extend 4 to 8 feet underground and are lined with materials such as grass clippings, feathers, paper, and manure. They inhabit prairies, pastures, and agricultural fields. They feed on insects, small reptiles, and amphibians. Other important foods are snakes, birds, and rodents (FWC 2007a).

Brown Pelican. These birds are distinguished by their large stocky size and long flat bill. They are found in coastal environments where they feed on fish. Breeding in colonies takes place from December to February (Farrand and Bull 1994).

Wood Stork. Wood storks are the only storks that regularly inhabit North America. These wading birds are year-round residents of Florida and Georgia, though sightings occur within the other Gulf coastal states. Wood storks frequent fresh water and brackish coastal wetland habitats. This endangered species nests at a single site in Tampa Bay, the Dot-Dash colony at the mouth of the Braden River (Paul and Paul 2003). During the field survey of the tidally influenced canal (south conveyance ditch) in and adjacent mangrove site in the Project area, multiple wood storks were observed (Port Dolphin 2007b).

Florida Scrub Jay. The species-specific survey for scrub jays was performed utilizing the standard protocols as outlined by the USFWS and the FWC. No scrub jays or evidence of presence of the species was observed. As stated in USFWS and FWC Florida scrub jay survey protocols, the Port Dolphin scrub jay surveys were conducted within a few hours of sunrise for 5 days across potential habitat. Pedestrian transects were surveyed in suitable scrub jay habitat, which included the Shrub and Brushland habitat (FLUCCS 320) located at the very end of the proposed Project area. Each transect was walked, and specific locations were chosen for playback of scrub jay vocalizations.

Wading Birds. Wading birds, such as the white ibis, roseate spoonbill, the snowy egret, the tricolor heron, and the little blue heron, are common in the wetland marshes and mangroves. They feed on aquatic prey in shallow waters of the wetlands and use wetland shrubs and trees for nesting.

During the follow-up spring surveys at the conveyance ditch, two species of wading birds were noted. A roseate spoonbill (*Platalea ajaja*) and a white ibis (*Eudocimus albus*) were observed foraging in the conveyance ditch in May 2008. The Florida Natural Areas Inventory (FNAI) database report did not show the presence of any wading bird rookeries in or within close proximity to the Port Dolphin Project area. Due to the temporary nature of the majority of the impacts from the proposed Project, the mobility of wading bird species, the lack of known rookeries in close proximity to the Project area, and the presence of suitable habitat located outside of the influence of construction, it is anticipated that the proposed Port Dolphin project would result in no impact on wading birds or their habitat.

American Alligator. The American alligator is a large reptile weighing up to 500 pounds. Females average 8 feet long and males average 11 feet. The length of an alligator can be estimated by estimating the length of their snout. Each inch from the tip of the snout to the eyes, equals about 1 foot of length. They can be found in shallow lakes, ponds, and rivers. They eat turtles, snakes, birds, and small mammals, often feeding at night (FWC 2007b).

In the wild, alligators can live for 30 to 35 years. Courtship and breeding take place from April to May. In June and July, female alligators lay 20 to 50 eggs in nests of mounded vegetation, where the eggs incubate for 2 months. The female remains in the area to defend the nest against raccoons and other egg-eating predators. Six- to 8-inch-long alligators hatch out in mid-August to mid-September; unlike the adults, these youngsters are banded or splotched with yellow, though they darken as they mature (FWC 2007b).

Eastern Indigo Snake. The Eastern indigo snake is a large, docile, nonpoisonous snake growing to a maximum length of about 8 feet. The color in both young and adults is shiny bluish-black, including the belly, with some red or cream coloring about the chin and sides of the head. They feed on an assortment of amphibians, reptiles, and small mammals. Eastern indigo snakes are most notably found in dryer habitats (like gopher tortoise burrows), and also inhabit hydric hammocks and areas around ponds. In wetter habitats that lack gopher tortoise burrows, Eastern indigo snakes can take shelter in hollowed root channels, hollow logs, or the burrows of rodents. In central and coastal Florida, they are mainly found within many of the State's high, sandy ridges. The Eastern indigo snake has been observed laying eggs in gopher tortoise burrows in high pineland areas, and in stump holes in flatwoods and pond edge habitats. Based on observations of captive indigos at Auburn University, mating begins in November, peaks in December, and continues into March. Clutches averaging eight to nine eggs laid in late spring hatch approximately 3 months later. The snakes remain active to some degree throughout the winter, often emerging from their dens whenever air temperatures exceed 50 °F (USFWS 1991).

Gopher Tortoise. The gopher tortoise averages 9 to 11 inches long, but can attain lengths of 15 inches. It can weigh up to 15 pounds. It occurs throughout Florida but prefers sandy, well-drained upland areas.

Tortoises can also be found in habitats such as utility line ROWs, fence rows, pastures, and field edges. They eat grasses, bean-family plants, fruits, and grasslike plants of the sunflower family. Gopher tortoises excavate burrows averaging 15 feet in length, but some burrows can be up to 48 feet long and about 6 feet deep. Gopher tortoise burrows can be used by many other species, including the Florida gopher frog and Eastern indigo snake (FWC 2007c).

The majority of the habitat along the proposed pipeline corridor contains disturbed lands dominated by Brazilian pepper and other exotic and nuisance species. As a result, only minimal habitat is available for gopher tortoises along the pipeline route. No gopher tortoises or burrows were observed at the time of the initial investigations and, as a result, no follow-up survey was scheduled. However, during the species-specific surveys, a gopher tortoise burrow was observed. The investigations were conducted at the scrub

and brushland habitat (FLUCCS 210) in the location proposed for the Interconnection Station in May 2008. The burrow was marked via a GPS and classified as active.

Florida Gopher Frog. The Florida gopher frog is a stout-bodied frog from 2 to 4 inches long found throughout most of the Florida peninsula. It is cream- to brown-colored, with irregular dark spots on its back and sides (FWC 2007d). Gopher frogs travel great distances, as much as a mile or more, to breed in temporary ponds year-round, laying eggs in shallow water. As adults, they hop into surrounding uplands, where they find a home in the active burrow of a gopher tortoise. They might also use a stump hole or the abandoned burrow of a small rodent. They are nocturnal, and seldom range far from their daytime retreat (FWC 2007d). Their call is a deep guttural snore, and heavy rains at any season can stimulate choruses, many of them calling at once. Because of habitat destruction, the gopher frog is very rare in its traditional southern range (FWC 2007d).

3.3 Cultural Resources

3.3.1 Definitions of a Resource

Cultural resources include historic properties, which are defined under the NHPA as prehistoric or historic 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 agencies to take into account the effect of their undertakings on properties listed in, or eligible for listing in, the NRHP and to afford the ACHP an opportunity to comment on the undertaking. For onshore, nearshore, and offshore project components, the SHPO aids in the determination of NRHP eligibility of cultural resources and provides guidance and recommendations concerning identified historic properties. 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, the EO for the Protection and Enhancement of the Cultural Environment (EO 11593), the Florida Historical Resources Act (Chapter 267, F.S., rev. 2004), and the Florida Division of Historical Resources' *Performance Standards for Submerged Remote Sensing Surveys* (v. 2.1 [2001]).

For onshore project components, the SHPO aids in the determination of impacts on cultural resources. The FERC has issued *Guidelines for Reporting on Cultural Resources Investigations for Pipeline Projects* (2002) for projects requiring a FERC certificate under Sections 3 and 7 of the NGA. In this EIS, the FERC is assisting the USCG in the review of cultural resources. Cultural resources onshore in Florida might include prehistoric and historic archeological sites; built resources; landscapes; and resources of traditional, religious, or cultural significance to Native American tribes. Any cultural resources that are identified onshore during the survey must be avoided or have their eligibility for listing in the NRHP assessed against significance criteria developed by the NPS. In addition, other important aspects of archeological surveys, such as its research design and scope, are discussed and agreed to in consultation with the SHPO in anticipation of, and prior to, conducting archeological surveys.

For nearshore project components in Florida state waters, the SHPO's role is essentially the same as that for the onshore project elements, and is guided by the Florida Historical Resources Act (Chapter 267, F.S., rev. 2004), the Florida Division of Historical Resources' *Performance Standards for Submerged Remote Sensing Surveys* (v. 2.1 [2001]).

The Maritime Administration is responsible under Section 106 for assessing impacts of the proposed offshore activities on submerged archeological resources. Although deepwater ports are not regulated by MMS, the Applicant would follow MMS guidance for ensuring compliance with the requirements of Section 106 as provided through NTL No. 2005-G07, *Archeological Resource Surveys and Reports*, as

well as through its other published guidelines, including NTL No. 2007-G01, *Revisions to the List of OCS Lease Blocks Requiring Archeological Resource Surveys*, and the NTL 2008-G05, *Shallow Hazards Program*. MMS has issued regulations at 30 CFR 250.194, 250(b)(15), 250.203(o), 250.204(b)(8)(v)(a), 250.204(s), and 250.1007(a)(5) that require preparation of an archeological resources report based primarily on the assessment of data obtained from the remote sensing survey. This survey would provide adequate information to determine the existence of archeological resources potentially affected by a proposed project (MMS 1999, 2005).

Determination of an archeological survey is based on whether the proposed Project area is within an MMS Lease Block included on the Archaeology Survey Blocks list on the MMS Internet Web site: http://www.gomr.mms.gov/homepg/regulate/environ/archeological/surveyblocks.pdf. For offshore prehistoric resources, all leases shoreward of the 45-m (146-foot) bathymetric contour require an archeological survey before initiating exploration and development activities. Archeological resources in the GOM that could be affected by the Proposed Action or Alternatives include inundated prehistoric sites and offshore historic shipwrecks.

If the Section 106 survey finds evidence of a possible archeological resource within nearshore (state) or offshore (Federal) waters in the ROW or lease area, the Applicant or Lessee must either redesign the proposed activity to avoid impacting the possible resource or conduct further investigations to determine if an archeological resource actually exists at the location and whether it is NRHP-eligible. If an NRHP-eligible archeological resource is present at the location of a proposed activity and project-related impacts on the resource cannot be avoided, the Applicant would consult with the USCG and the MMS GOM Regional Supervisor to determine the procedures required to mitigate or minimize impacts on the resource.

3.3.2 Port Site and Offshore Routes

The area of potential effect (APE) is defined under 36 CFR 800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." The APE is influenced by the scale and nature of an undertaking and might be different for different kinds of effects caused by the undertaking. The Port Dolphin Project APE encompasses all areas wherein construction, operation, and decommissioning activities might occur. For cultural resources, the surveyed APE for the marine portion of the Project is composed of offshore and nearshore elements. The offshore element is located in Federal waters and consists of the Port (i.e., the North and South LNG buoy moorings situated in MMS PB blocks PB545 and PB589, their anchors, and their feeder lines suspended off of the seafloor that depart the buoys and meet at a piggable-Y), and a segment of the connecting 36-inch pipeline. The nearshore element consists of the remaining length of the 36-inch pipeline that extends through state waters from the Federal-State waters boundary to the route's landfall at Port Manatee in Tampa Bay. The survey area for the Port encompasses approximately 22 acres. The survey area for the pipeline covers an approximately 42 mile-long-by-3,000-foot-wide corridor centered on the pipeline's route, extending from a point 46.4 km (29 mi) west-southwest of the entrance to Tampa Bay, Florida, to an HDD landfall between the Gulfstream Pipeline and the Port Manatee Shipping Channel in southeastern Tampa Bay at Port Manatee.

Archeological resources potentially present in the marine APE would include not only material lost or discarded in the course of maritime activity, but also artifacts from human settlements in the area when sea level was lower and dry land capable of supporting human settlement was present. MMS baseline studies (CEI 1977, Garrison et al. 1989, Pearson et al. 2003) and the research conducted for this Project indicate a high probability of archeological resources dating from the pre- through post-contact periods.

Predictive models based on correlations between prehistoric archeological sites and geomorphic landforms suggest that PaleoIndian and Archaic Period sites in Florida might be associated with natural levees, margins, point bars, and terraces of alluvial streams; the margins of bays, lakes, and estuaries; sinkholes; and relict beach ridges. Consequently, these or related landforms in presently submerged areas represent "archeologically sensitive" high probability zones for the occurrence of archeological sites from these time periods. Based on the estimated location of the PaleoIndian shoreline, coinciding with the approximately 130-foot isobath submerged offshore of the western coast of Florida, the marine portion of the Project APE is situated within the portion of the OCS that could contain undisturbed remnants of the formerly exposed landscape that was available for human occupation and settlement between circa 12,000 and 3,000 years before present (BP). Archival research performed for the Project indicates that there are no previously recorded submerged prehistoric archeological resources or NRHP-eligible or NRHP-listed sites in the marine APE (LAI 2007).

Archival research to determine the presence or reported incidence of historic shipwrecks within the marine APE and adjacent waters identified numerous reported wrecks/obstructions off of the West Coast of Florida and in the approaches to the Tampa Bay area. These reported items include vessels dating from the earliest period of European colonization through the present day, some of which might qualify as NRHP-eligible resources. The locations are in most cases vague or undetermined. Vessel casualty lists primarily include large commercial craft from the late 19th and 20th centuries; older and smaller vessels might not be listed. No references to lists and charts published by the U.S. Department of Transportation, USCG Local Notices to Mariners, the National Ocean Service Navigation Charts, the NOAA's AWOIS (Automated Wreck and Obstruction Information System) online database (2007), as well as a review of Berman (1972), Marx (1985), Potter (1988), Singer (1992), and the MMS' Shipwreck Database (Pearson et al. 2003) document any vessel casualties specifically within the Project area. No sites listed in the NRHP or eligible for listing in the NRHP are reported in the Project area. Documented 19th- and 20th-century vessel casualties in the vicinity of the Tampa Bay portion of the marine APE include *Isis* (1842), *Eugene Batty* (1906), *Wave* (1908), *Davy Crockett* (1909), *Water Boy* (1911), *City of Sarasota* (1919), *Thomas B. Garland* (1921), *Bon Temps* (1921), *Gwalia* (1925), *Stranger* (1927), *Belmont* (1940), *Kim Too* (1955), *Barge No. B-29* (1955), *Miss Powerama* (1962), *Buhnday* (1966), and *Ranger III* (1966). Four obstructions are listed in the AWOIS files of the survey area: Nos. 10318, 9833, 10310, and 10312. No. 10318 was reported to be a cylindrical tank. No. 9833 was a metal-hulled watercraft identified as similar to an aluminum SeaArk boat. No. 10310 was found to represent several chunks of concrete, while No. 10312 represents a metal tank.

Previous Cultural Resources Surveys. In October and November 2006, the Applicant conducted a comprehensive remote sensing survey of the offshore portion of the Project using an echo sounder, side-scan sonar (i.e., 100 and 500 kHz frequencies collected simultaneously), marine magnetometer, and subbottom profilers. The survey grid over the buoy mooring area was composed of primary track lines spaced 100 m apart with six tie lines about 1,000 m apart. In Federal waters, the corridor width of 3,000 feet was covered by parallel track lines spaced 50 m apart. In Florida state waters, the line spacing decreased to a 25-m interval. Additional track lines were surveyed in Tampa Bay parallel to the fishing pier and the Sunshine Skyway Bridge. In the west-central portion of the mooring area, buried fluvial channels were recorded that do not appear significantly affected by erosion and therefore are identified as high probability areas for prehistoric archeological sites. Eleven unidentified sonar contacts were recorded during the survey, including three in Federal waters and two in Florida waters. The Phase 1 geophysical survey magnetometer and side-scan sonar data cultural resources evaluation resulted in the identification of three unidentified side-scan sonar contacts (one in Federal waters) and 15 unidentified magnetic anomalies (all but one in Florida waters) interpreted as possible historic shipwreck remains.

The Proposed Site and Route Alternative and the Southern Site and Route Alternative were surveyed in sections between October 3 and 31, 2006; November 1 and 15, 17 and 21, and 23 and 26, 2006; and

September 10 and 17, 20 and 24, and 26 and 29, 2007. Archeologically sensitive areas that were identified during surveys and recommended for avoidance during construction, operation, and decommissioning of the Project include the following:

- Margins of buried relict fluvial channels in the Port's buoy mooring area in MMS PB blocks PB545 and PB589 that retain geomorphic features representing high-probability areas for prehistoric archeological sites should be avoided by a distance of 250 feet, as delineated on Map 2, Sheet 1 of LAI's (2006) Appendix A: Archeological Assessment report (Confidential Document).
- Three unidentified side-scan sonar contacts and 15 unidentified magnetic anomalies that might represent possible historic shipwreck remains. Sonar Contacts 1, 6, and 9 should be avoided by a distance of 300 feet. Magnetic anomalies Nos. 15, 18, 28, 29, 50, 53, 100, 185, 186, 196, 197, 200, 212, 213, 283, and 287 should all be avoided by a distance of 200 feet (LAI 2006).
- No geomorphic features representing high-probability areas for prehistoric archeological sites were recorded in the data sets associated with the realigned proposed or alternative routes.
- One unidentified side-scan sonar contact associated with three unidentified magnetic anomalies representing possible historic shipwreck remains. Alternative Route Sonar Contact 1 and magnetic anomalies Nos. 874, 889, and 915 should be subjected to physical examination to conclusively identify and determine their source, or avoided by a distance of 1,000 feet, as per MMS's recommendation (included in their February 29, 2008, comments on the Interim Draft EIS), rather than simply avoided by a distance of 500 feet, as recommended and delineated in LAI's 2007 Appendix A: Archeological Assessment report (Confidential Document) for Alternative A (the proposed nearshore route).

3.3.3 Onshore Route

The onshore portion of the pipeline would make landfall at the pier bulkhead at Port Manatee, and continue inland approximately 6.4 km (4 mi) to an interconnect with the Gulfstream Natural Gas System, LLC pipeline system, and the TECO Bayside Gate System. The APE for this pipeline corridor option includes the 6.4-km (4-mi) length of the proposed pipeline and a corridor width of 100 feet, areas designated for temporary work spaces, and the interconnections stations.

Previous Cultural Resources Surveys. Review of the Florida Master Site File (FMSF) shows two previously recorded prehistoric sites (8MA1228, 8MA1478) within the APE for the onshore route, which is the same for both the Proposed Route and the Southern Route Alternative. Three additional prehistoric sites (8MA1165, 8MA1166, 8MA1227) are within one-half mile of the onshore route. The majority of the sites surrounding the onshore routes are prehistoric sites with unspecified associations and time periods. One exception is site 8MA1166, which is north of the APE near Piney Point. This site was recorded as a "late prehistoric earthwork" feature. However, subsequent survey results did not support the earthwork hypothesis; the SHPO has determined that the site is not eligible for the NRHP.

No previously recorded structures are within the APE. Two historic structures were identified within one-half mile of the APE for the proposed onshore route, south of the western segment of the Pipeline survey area. Both of these structures (8MA1210 and 8MA1211) date to the early 20th century, 1911 and 1921, respectively. Neither structure is eligible for listing in the NRHP, and neither was found to be locally or regionally significant. A third recorded structure (8MA1324) lies more than one-half mile southeast of the TECO Interconnection Station and the TECO Bayside Gate station. This house dates to the 1940s and has not been evaluated by the SHPO's office.

In September 2003, Archeological Consultants, Inc. conducted a survey (FMSF Survey 9110) that included parts of the Pipeline Project area within Sections 10 and 11 of Township 33 South, Range 18 East. This survey included both pedestrian surface and subsurface investigation. The Project area included parts of the proposed Port Dolphin Pipeline corridor from I-75 to Grass Farm Road (the section line between Sections 10 and 9, misidentified as Bud Rhoden Road in the FMSF report), south of Buckeye Road. According to the shovel test map, approximately 10 shovel tests were placed within or adjacent to the pipeline Project area. No cultural material was recovered from the area, which was described as old orange groves and improved pasture. Though the authors do not specify the degree of disturbance and modification, the presence of pumphouses and drainage canals suggests extensive disturbance.

In June 1990, Piper Archaeology investigated an area that overlaps a portion of the APE for all three pipeline corridor options discussed below. This survey project, designated FMSF 2443, totaled 1,100 acres within Section 9, Township 33 South, Range 18 East. The area investigated lies south of Buckeye Road, from the section line separating Sections 9 and 10 to an unnamed road through orange groves in the west. This survey describes extensive modification of the land including 60- to 80-cm deep furrows between every other row of trees. The survey's goal was the relocation and reevaluation of site 8MA49, previously recorded as an aboriginal earthwork. Shovel tests were excavated in transects and placed judgmentally throughout the Project area. In the opinion of Piper Archaeology, site 8MA49 was either misreported on the site file form, destroyed, or a misidentified late historic "water control feature." Although Piper Archaeology dug only 20 shovel tests within Section 9, its opinion was that this adequately covered the area due to the degree of disturbance.

In late 2000, Louis Berger Group, Inc., conducted a survey (FMSF Survey 6510) of 120 acres in Sections 6 and 7, Township 33 South, Range 18 East. The Project included the area west of Bud Rhoden Road, south of Buckeye Road, and was bounded on the west by property lines. No cultural materials were recovered from shovel tests. The most extensive testing occurred within a 25-acre area, with shovel test placement following a 30-m grid. The investigators state the area's soils have been disturbed from agricultural activity, including the creation and maintenance of drainage ditches.

Much of the Proposed Route Alternative follows the existing pipeline previously investigated by Janus Research. A review of the relevant survey reports (FMSF Surveys 6297, 6332, and 7328) reveals an adequate level of testing for much of the Proposed Route Alternative currently under investigation. Janus Research registered two archeological sites (8MA1227 and 8MA1228) within or near the Pipeline Project area. Each site consisted of a single shovel test producing a lithic flake. The delineation of these sites included substantial testing within the Port Dolphin pipeline APE. The reported level of disturbance and modification to the corridor limits the likelihood of intact archeological sites.

In 1982, Archeological Consultants, Inc. conducted an archeological survey (FMSF Survey 788) that includes part of the Pipeline Project area. The investigation used both pedestrian surface survey and subsurface testing. The authors reported no cultural materials, listed all shovel testing as "judgmental," and did not provide a map or description of shovel test locations. Both the date and the text of the survey suggest this was not a systematic inventory. This survey extends from the point at which the Proposed Route Alternative crosses South Bay (or Del Monte) on the west to the point at which the Pipeline corridor returns south of South Bay, just before reaching U.S. Highway 41.

Known Cultural Resources along the Proposed and Alternative Onshore Route. The onshore portion of the pipeline would make landfall at the pier bulkhead at Port Manatee, and continue inland approximately 6.4 km (4 mi) to an interconnect with the Gulfstream Natural Gas System, LLC pipeline system and the TECO Bayside Gate System. The APE for this pipeline corridor option includes the 6.4-km (4-mi) length of the proposed pipeline and a corridor width of 100 feet.

In January and November 2007, Southeastern Archeological Research, Inc. (SEARCH) conducted a Phase 1 cultural resources survey of the APE for the pipeline corridor. The APE was defined as the length of the corridor and the 100-foot width of the construction ROW. A pedestrian survey and 138 shovel tests were excavated along the route corridor, with the bulk of the APE subjected to 25- and 50-m testing. The eastern third was tested at 100-m intervals, due to low expectation of archeological resources, and the fact that this segment had been previously surveyed by Janus Research (FMSF Surveys 6297, 6332, and 7328). No historic structures were encountered within the APE. The survey indicates that the 100-foot width of route has been subjected to large amounts of ground disturbance from utility and previous pipeline installation, roadwork, and drainage activities.

Two of the SEARCH shovel tests contained historic or prehistoric artifacts that were designated as Archeological Occurrences (AOs). The two AOs are in disturbed contexts and are not eligible for listing in the NRHP. The Florida SHPO concurred with these recommendations on February 18, 2008 (see **Appendix B**).

Interconnection Station, Valve Station, and Work Spaces. The APE for the onshore portion of the Project also includes the footprints for the valve station, extra workspaces, and one interconnection station. The onshore valve station would be located just east of the Gulfstream valve station within Port Manatee property. The valve station is 0.07 acres in area (50 feet by 60 feet). The Interconnection Station parcel is in a general agricultural zoned area beside the Buckeye Road and measures 3 acres. It is adjacent to the existing Gulfstream station. Staging areas, the pipe yard, and the concrete batch plant and storage facility would be located within Port Manatee. On February 17, 2009, the SHPO concurred that no further survey work was required for these areas within Port Manatee. Installation of the onshore pipeline would also require a number of small workspaces for road and stream crossings along the pipeline route.

Native American Consultation. Independent research was conducted into which Native American tribes historically used the pipeline Project area. The federally recognized tribes listed on the Native American Consultation Database as having an interest in the Pipeline corridor location are the Miccosukee Tribe of Indians of Florida, Muscogee (Creek) Nation of Oklahoma, Poarch Band of Creek Indians, Seminole Nation of Oklahoma, and Seminole Tribe of Florida. Consultation letters were sent with a set of the maps showing the pipeline Project area location and the pipeline corridor in April 2007 and again in January 2008 as part of the offshore geophysical survey (see **Section 3.4.3**) for the December 2007 Port Dolphin Energy Deepwater Port Application Addendum *Environmental Evaluation*.

3.4 Geological Resources

3.4.1 Definition of the Resource

Geological resources within a given physiographic province consist of the surface and near-surface materials (i.e., rock and soil) of the earth and regional or local forces by which they are formed. These resources are typically described in terms of regional and local geology, soil resources, topography, mineral (paleontological, if applicable) resources, and geologic hazards. Regional and local geological resources comprise earth materials within a specified region and the forces that have shaped them. This includes bedrock or sediment type and structure, unique geologic features, depositional or erosional environment, and age or history. Soil resources are the unconsolidated, terrestrial materials overlying the bedrock or parent material and are typically described in terms of their complex type, slope, and physical characteristics (i.e., strength, expansion potential, cohesion, grain size, and organic composition). Bathymetry is the discussion of the geomorphic characteristics of the seafloor surface, including elevations, relationship with adjacent land features, and geographic location. Mineral and paleontological resources include usable geological materials that have some economic or academic value and significant

artifacts. Geological hazards comprise the regional or local forces or conditions that could affect a proposed development or use (e.g., seismicity, slope stability, competency of bedrock, and subsidence or settlement).

The study area for this analysis includes both onshore and offshore components. Offshore, the major components of the Project, the STL buoy system and proposed pipeline, would be a distance of approximately 67.6 km (42-mi) from Tampa Bay (i.e., the distance from the offshore facilities east to landfall in Manatee County, Florida). The Port would be located in a water depth of approximately 30.5 m (100 feet) and, more specifically, would consist of two submersible unloading buoys and two flowlines, each connecting the two buoys to a natural gas transmission pipeline. The flowline from the north buoy is approximately 3.2 km (2 mi) in length. The flowline from the south buoy is approximately 3.2 km (2 mi) in length. Equipment aboard vessels built specifically to transport and revaporize LNG using onboard equipment would regasify LNG, and a pipeline from the Port would deliver the natural gas to the Gulfstream and TECO pipelines.

Onshore, the pipeline would proceed east across Port Manatee property through a tidally influenced conveyance ditch through Reeder Road to just west of the CSX railroad. At that point the pipeline would turn south on the west side of U.S. Highway 41 through the FPL tank farm before turning east again. The pipeline would turn east again to cross the CSX railroad and U.S. Highway 41. The pipeline would end at the interconnection with Gulfstream and TECO pipelines within the Margaret Mock Industrial property.

3.4.2 Offshore Regional Geology

The Florida peninsula is the emergent portion of the wide, relatively flat geologic feature called the Florida Platform, which separates the waters of the GOM and the Atlantic Ocean. The edge of the Florida Platform is arbitrarily defined to be where water depth is 300 feet (91.44 m). On the central coast of Florida, the edge of the platform lies more than 100 mi (160 km) west of Tampa (USGS 2001).

Early development of the carbonate Florida Platform began during the Cretaceous period. During the late Paleogene, the Appalachian Mountains were uplifted, causing an increase in the erosion and deposition of siliciclastic sediments into the Gulf Trough. The siliciclastic invasion, as it is commonly known, whereby quartz sand moves south along the beaches that border Florida, is a process that continues to this day. There is, however, no mechanism by which siliciclastic sediments move toward the western edge of the Platform, resulting in a transition from quartz-rich sediments on the eastern edge of the peninsular to carbonate-rich sediment toward the west.

The inner shelf off the west-central barrier-island system forms part of that quartz carbonate transition (USGS 2003), with a thin veneer of sediments generally less than 3 m (10 feet) thick. As expected, these unconsolidated sediments fill in areas where outcrops of the underlying limestone surface are not exposed.

At least 50 percent of the inner-central West Florida shelf is covered with extensive networks of hard-bottom formations referred to locally as “ledges.” These ledges can show up to 13 feet (4 m) of relief. Two types of rock (dolomitric and calcitic) form these ledges, which lie roughly parallel to shore (USGS 2003). Several studies have indicated that the inner shelf is overlain by northwest-southeast-trending quartz-rich sand ridges that extend more than 12.4 mi (20 km) out onto the shelf (USGS 2003).

A timeline highlighting important geologic events in the history of Florida is provided in **Table 3.4-1.**

Table 3.4-1. Important Geologic Events in the History of Florida

Era	Period	Epoch (million years ago)	Important Geologic Events in Florida
Cenozoic	Quaternary	Pleistocene (1.6)	Intervals of climate cooling and warming occurred as a result of glaciers covering then retreating over most of North America. Glaciers did not extend to the southeastern states. Glaciers had the effect of rising and falling sea levels in southern states.
	Tertiary	Pliocene (5)	Quartz sand extended from the north to the extreme southern margin of the Florida platform.
		Miocene (24)	A river delta up to 393 feet (120 m) thick filled accommodation space within the south-central platform (USGS 2003).
		Oligocene (36)	Northern Florida and Georgia (Gulf Trough area) infilled. Initial phase of Florida's siliciclastic invasion begins, moving quartz sand south along the beaches bordering peninsular Florida (USGS 2003).
		Eocene (58)	-
		Paleocene (65)	Appalachian Mountains uplifted, erosion increased, and siliciclastic sediment filled the Gulf Trough.
Mesozoic	Cretaceous	145	Early development of the carbonate Florida Platform (USGS 2003). Western portion of Florida Platform drowned, sea levels rise (occurring during Mid-Cretaceous period).
	Jurassic	208	Rifting complete, mid-Atlantic ridge developing, North American continental plate forced away from Africa. Gigaplatform system begins developing.
	Triassic	245	Pangaea beginning to divide into two major continents. Atlantic Ocean beginning to spread.
Paleozoic	Permian	286	-
	Pennsylvanian	320	-
	Mississippian	360	-
	Devonian	417	Acadian Mountains developing, eventually known as the northern Appalachian mountains.
	Silurian	443	Erosion and deposition of sediments and an accumulation of sedimentary rocks occurred in the southeast.
	Ordovician	495	Volcanic activity and deposition of marine sediments in northwestern Africa, an area that would eventually become Florida.
	Cambrian	545	-
Precambrian Eon	Proterozoic Eon	2,500	700 million years ago: collision and rifting of supercontinent Gondwana.
	Archean Eon	(billion years ago)	-

Sources: Lane 1994; USGS 2003; FDEP 2006b.

Bathymetry. Bathymetry of the central-west shelf indicates northwest-southeast-trending ridges exist nearshore. A second set of ridges are further offshore, oriented in a similar trend as the inshore ridges. Tampa Bay marks the northern extent of these shelf-valley depressions. This shelf-valley system appears to disappear between 65 to 98 feet (20 to 30 m) water depth west of the present mouth of the bay (USGS 2003).

Bedrock. Holocene sediments (Qh) make up the geology of much of the Tampa Bay, the mouth of the bay and immediate surrounding coastal barrier islands and keys. Shelly sediments of the Plio-Pleistocene age (TQsu) are identified southeast of the Terra Ceia AP (Rattlesnake Key, Terra Ceia Bay, Palma Sola, and Miguel Bay) (Scott et al. 2007a, 2007b).

Mineral Resources. A review of the USGS topographic quadrangles for the Project site and other geologic and nautical maps of the area indicate that there are several mining operations occurring in Tampa Bay. In the Hillsborough Bay section of Tampa Bay (northeast subdivision of the bay), large deposits of oyster shells underlie the bay and have been mined for many years for fill material (SWFWMD 1999). As is evident from the Anna Maria 7.5-minute series USGS topographic quadrangle, discontinued disposal and spoil areas are mapped south of the Egmont Channel.

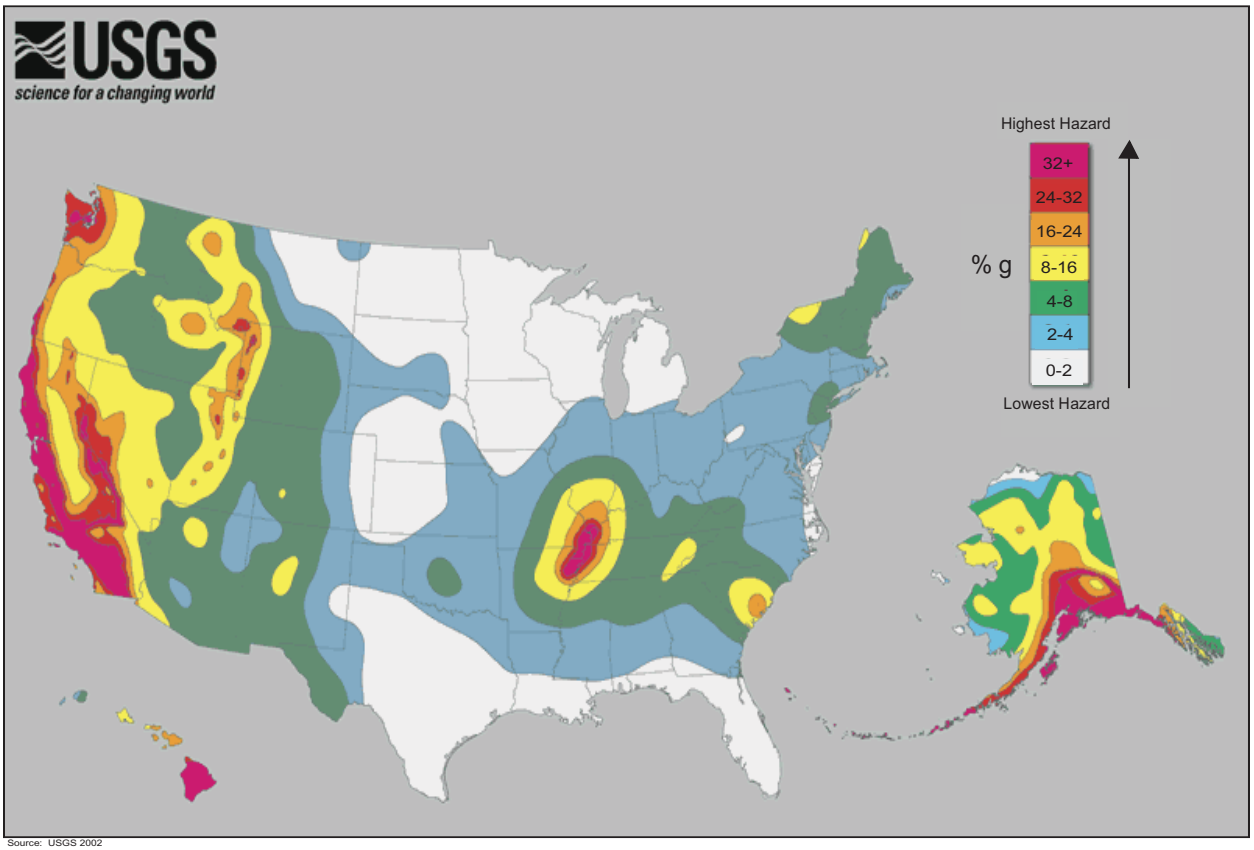
The only active mineral resource use in the region consists of dredging of nearshore sand deposits for beach renourishment and other coastal engineering projects in Florida (Hatchett et al. 2006). Active mining permits have been issued for land south of the proposed pipeline (Port Dolphin 2007l). Three inactive mining areas are depicted on the Cockroach Bay 7.5-minute series USGS topographic quadrangle within the Project area. Vacant land south of the proposed pipeline route might be candidate sites for future mining of sandy soils.

No significant oil or natural gas finds have occurred during exploratory borings drilled off the central West Florida Shelf south of the Panhandle area. Currently, there is a moratorium on petroleum exploration in Federal waters off the West Florida shelf (Port Dolphin 2007c).

Seismicity. A review of the United States Earthquake Hazards Map that is published by the USGS indicates that southeastern United States is considered an area of low earthquake hazards. The USGS Seismic Risk Map of Florida shows the proposed pipeline route is located in Zone 0, meaning there is no expected damage from an earthquake. The USGS Earthquake Probability Mapping tool identifies the pipeline route as having between a 0.006 and 0.007 probability of a magnitude 4.75 quake occurring in the next 50 years (USGS 2008).

The Florida Platform is considered a seismically stable area, and only two quakes have been felt in Florida since 1990. In 2006, two quakes were reported from the same location (February 10 and September 11, 2006) with magnitudes of 5.2 and 6.0 respectively, and both quakes centered about 416 Km (260 mi) southwest of Tampa. The magnitude 6.0 quake was reported to be the largest earthquake to occur on the eastern GOM in the past 30 years.

No active or inactive faults exist in the Project area, but several karst features have been reported from the eastern area of Tampa Bay (FERC 2001b). **Figure 3.4-1** depicts the USGS Earthquake Hazards Map and **Table 3.4-2** outlines a chronology of reported earthquakes in and around Florida.



Source: USGS 2002

Figure 3.4-1. USGS Earthquake Hazards Map

Table 3.4-2. Timeline of Earthquakes in Florida

Date	Occurrence
October 29, 1727	Unofficial sources reported a severe quake, of intensity MM VI (Modified Mercalli VI), in St. Augustine, but the original record has not been located (recorded as one of the largest earthquakes in Florida history.) New England had a severe shock about 10:40 a.m. on this date, and a quake was reported on the island of Martinique, in the Caribbean, on the same day.
February 6, 1780	Pensacola felt a tremor described as "mild."
May 8, 1781	Pensacola suffered a "severe" tremor that shook ammunition racks from barrack walls and leveled houses, but no fatalities.
February 8, 1843	Earthquake in West Indies, felt in United States, intensity unknown.
January 12, 1879	Earthquake felt through north and central Florida bounded by a line drawn from Fort Myers to Daytona on the south, to a line drawn from Tallahassee to Savannah, Georgia, on the north, an area of about 25,000 square miles. Intensity MM VI near Gainesville. Recorded as one of the largest earthquakes in Florida's history. At 11:30 p.m. in Tampa, the quake was felt followed by rumbling sounds. Two shocks were reported in other areas at 11:45 p.m. and 11:55 p.m.
January 22–23, 1880	Earthquake in Cuba of intensity MM VII, about 192 km (120 mi) east of Havana. It was also felt in Florida.
January 27, 1880	Several shocks of intensity MM VII to MM VIII were felt in Key West resulting from a disastrous earthquake at Vuelta Abajo, about 80 miles west of Havana, Cuba.

Date	Occurrence
August 31, 1886	The great earthquake in Charleston, South Carolina, MM X. This quake was felt all over north Florida, with an estimated intensity of MM V to MM VI. Church bells rang in St. Augustine, and severe shocks were felt along the east coast. Quake effects were felt in Tampa.
September 1–9, 1886	Jacksonville felt more aftershocks of intensity about MM IV from the Charleston quake.
November 5, 1886	Jacksonville felt another aftershock from the Charleston quake.
June 20, 1893	Jacksonville felt a tremor at 10:07 p.m. of estimated intensity MM IV.
October 31, 1900	U.S. Coast and Geodetic Survey recorded a local shock of MM V at Jacksonville.
January 23, 1903	Shock of intensity MM VI felt at Savannah, Georgia, and effects also felt in Florida.
June 12, 1912	Strong shock of unknown intensity felt at Savannah, Georgia; also felt in Florida.
June 20, 1912	Shock of intensity MM V felt at Savannah, Georgia; probably associated with the above quake of June 12. It was also felt in Florida.
1930, exact date unknown	An earth tremor was felt over a wide area in central Florida near LaBelle, Fort Myers, and Marco Island. Thought to be from an earthquake, but some persons believed it was tremendous explosions, though no explosions were known to have been detonated. Estimated intensity at Marco Island was MM V.
November 13, 1935	Two short tremors were felt at Palatka in the early morning. The second shock was felt at St. Augustine and on nearby Anastasia Island. Estimated intensity at Palatka was MM IV or MM V.
January 19, 1942	Several shocks felt on south coast of Florida, with some shocks felt near Lake Okeechobee and in the Fort Myers area. Estimated intensity was about MM IV.
January 5, 1945	About 10 a.m. windows shook violently in the DeLand courthouse, Volusia County.
December 22, 1945	Shock felt in the Miami Beach-Hollywood area at 11:25 a.m. Intensity was MM I to MM III.
November 8, 1948	A sudden jar, accompanied by sounds like distant explosions, rattled doors and windows on Captiva Island, west of Fort Myers.
November 18, 1952	Windows and doors were rattled by a slight tremor at Quincy, about 20 miles northwest of Tallahassee.
March 26, 1953	Two shocks estimated as MM IV were felt in the Orlando area.
October 27, 1973	Shock felt in central-east coastal area of Seminole, Volusia, Orange, and Brevard counties, at 1:21 a.m., maximum intensity MM V.
December 4, 1975	Shock felt in Daytona and Orlando areas at 6:57 a.m., maximum intensity MM IV.
January 13, 1978	Two shocks reported by residents in eastern part of Polk County, south of Haines City. Tremors were about one minute apart and each lasted about 15 seconds, shaking doors and rattling windows. The tremors occurred between 4:10 and 4:20 p.m. No injuries or damage were reported.
November 13, 1978	Tremor felt in parts of northwest Florida, near Lake City. Seismic station at Americus, Georgia, estimated it originated in the Atlantic Ocean.
December 1978 – January 1991	No tremors reported by Gainesville seismographic station.
February 10, 2006	Magnitude 5.2 quake occurred, centered about 260 miles southwest of Tampa.
September 11, 2006	Magnitude 6.0 quake reported in the same location as the February 10, 2006, quake. The earthquake occurred at 8:56 a.m. and was reported by more than 2,800 residents. It was felt on the Gulf coast and in central Florida, southern Georgia, Alabama, Mississippi, and Louisiana. Reported to be the largest earthquake to strike the eastern GOM in the past 30 years.

Sources: Lane 1994 and USGS 2007

3.4.3 Proposed Site and Route Geology

The major offshore components include the following:

- Two offloading buoys, commonly known as STL Buoys, which would be separated by a distance of approximately 5 km (3 mi) connected to two flowlines, each approximately 3.2 km (2 mi) long
- The 67.6 km (42 mi) offshore gas transmission line.

Survey Method and Equipment. A geophysical survey was conducted by T. Baker Smith in September 2007 (T. Baker Smith 2007). Data were collected from 82 track lines spaced at intervals of 100 m (328 feet) in the buoy mooring area; 19 parallel lines spaced at 50 m (164 foot) intervals, and 30 primary lines spaced at 25 m (82 foot) intervals in the pipeline area; and 13 track lines around nearshore features such as the Sunshine Skyway Bridge and the fishing pier. The following instruments were used to collect the geophysical data:

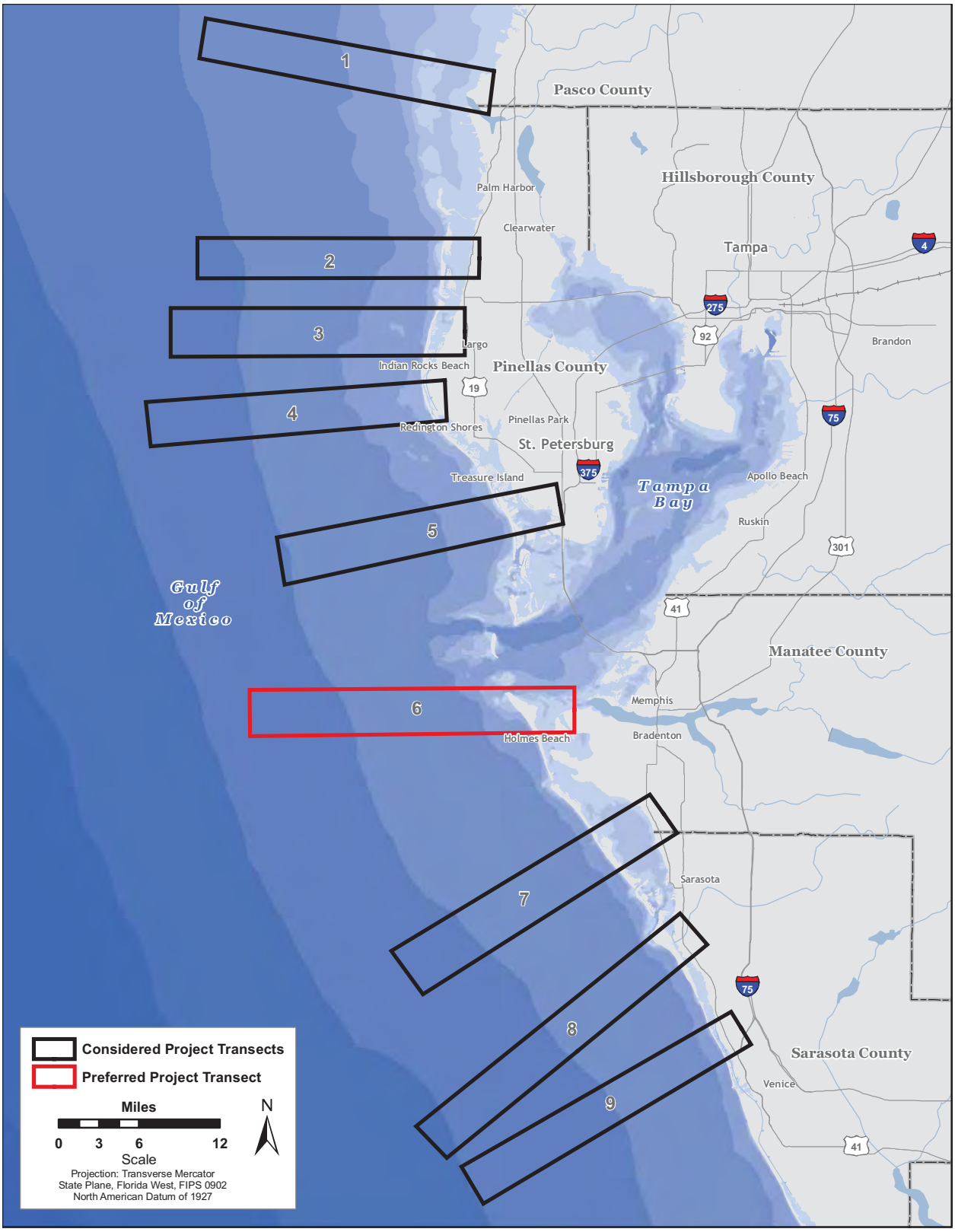
- Klein 300 (Side-scan sonar system)
- SeaSPY (Marine magnetometer)
- EdgeTech Model 3100-P (Subbottom profiler)
- EdgeTech Model 3200-XS (Subbottom profiler)
- Odom Echotrac Mark III (Echo sounder)
- Odom Digibar Pro Model DB1200 (Velocimeter)
- VT TSS Model HS-50 (Heave sensor)
- HyPack (Navigation and data acquisition software)
- Trimble Model DSM-232 (Global positioning system)
- Trimble Model MS-860 (Global positioning system).

An additional sand resource survey which included bathymetry, hard bottom, sand resources, and habitat classification surveys were conducted between Sta 1260+00 and Sta 1640+00 on the proposed pipeline alignment as part of the Port Dolphin Pipeline Offshore Geotechnical Investigation-Sand Source Re-Route Survey in 2008. The purpose of the survey was to determine a route that would reduce or avoid impacts to an permitted sand borrow area, a high volume sand shoal and other potential sand resources, and hard-bottom habitat along that section of the pipeline route.

In addition to the geophysical and sand source surveys, a former bathymetric study in the Project area was conducted by USGS entitled West-Central Florida Coastal Studies Project. The most relevant part of the study area involved investigative studies conducted along a transect located north of the proposed pipeline route (Transect #6). **Figure 3.4-2** depicts transects surveyed in the USGS study. Prior to this study, very little was known about the inner shelf, with the exception of the fact that limestone covered the area and sediment was noncontiguous along the floor of the shelf. A Summary of Findings of the West-Central Florida Coastal Studies Project is provided in USGS Open File Report 01-303 (USGS 2003).

Marine Sediments. Side-scan sonar indicated the primary sediment along the seafloor consists of sand and silty sand. In the mooring area and in the pipeline route, the seafloor showed a variety of features and bottom types. Hard-bottom areas were characteristic of bedded calcareous limestone scattered with coral colonies and deposits of shell hash. Sandy seafloor conditions were widespread in the survey area, with sand sheets covering some areas of hard bottom.

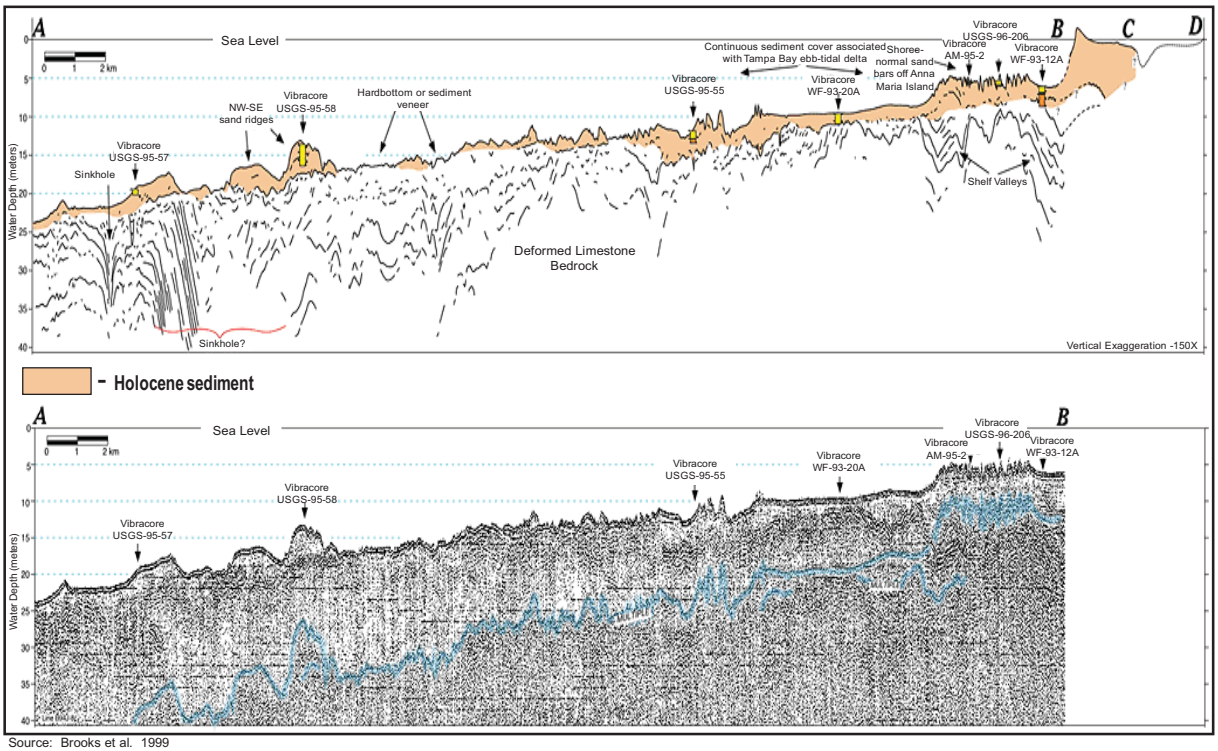
Modern sediment cover within the proposed pipeline can be more than 4 m (13 feet) thick offshore, corresponding with higher topographic relief of sand waves or ridges (USGS 2001). A cross-sectional



Source of Project Transects: USGS 2001

Figure 3.4-2. West-Central Florida Coastal Studies Project

view of Transect #6 (see **Figure 3.4-3)** of the West-Central Florida Coastal Studies Project depicts the offshore set of ridges, as well as shore-normal sand bars off Anna Maria Island. Seaward of the sand bars offshore Anna Maria Island is a wide apron of unconsolidated Holocene sediment associated with the Tampa Bay ebb-tide delta. The Tampa Bay ebb-tide delta is the primary modern source of sediments in the Inner Continental Shelf in this region. Sediment cover from this system extends approximately 10 km (6 mi) offshore (USGS 2001). The geophysical survey found that once inside the bay proper, the seafloor was observed to be primarily smooth sand with areas of sand waves that, from peak to peak, were approximately 4 to 20 m (13 to 65 feet) apart (T. Baker Smith 2007).



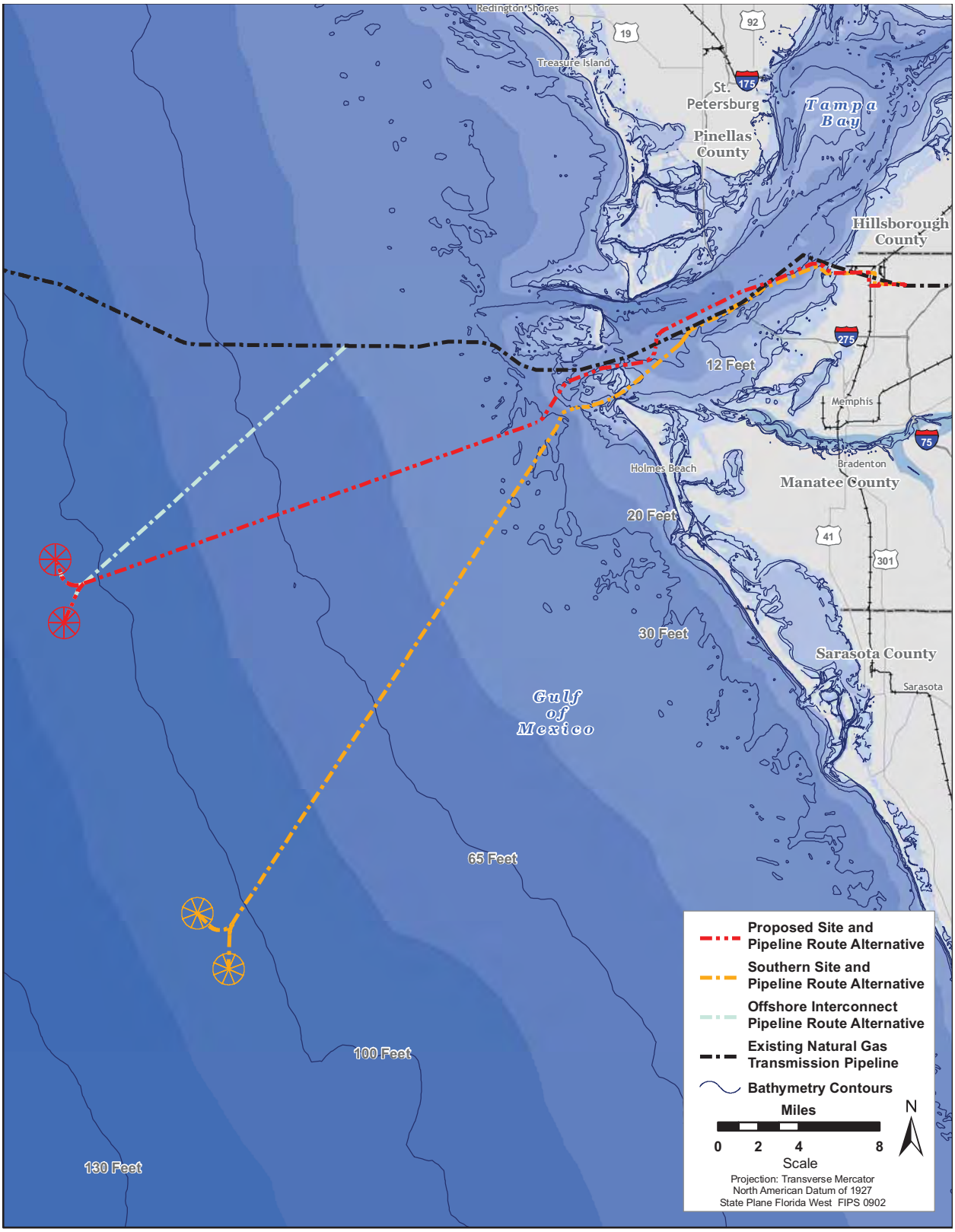
Source: Brooks et al. 1999

Figure 3.4-3. USGS Survey Area Transects

Sediment Veneers. In deeper areas of the shelf shown in the structural cross section (see **Figure 3.4-3**), Holocene sediment thins out and the substrate changes into extensive hard bottom or sediment veneers. These extensive hard-bottom features are present in the Proposed Site and Route Alternative (see **Appendix F2, Maps 4-6)**.

Bathymetry. The majority of the seafloor topography (in the proposed site and pipeline route) is relatively flat with minor undulations associated with migrating bodies of sand and other granular soils such as shell hash. **Figure 3.4-4** depicts the general bathymetry of the Project area. A relatively thin layer of probable sandy sediment covers the seafloor over the northwestern portion of the anchor mooring survey grid covering the mooring area. This layer varies in thickness between 0.3 to 6.0 m (1 to 20 feet) and appears to cover a relict seafloor that is characterized by its high amplitude, suggesting a well-compacted and hard surface in the mooring area. The remainder of the survey grid not covered by this thin veneer of sandy sediments exhibited very limited data penetration and resolution (T. Baker Smith 2007).

The geophysical survey showed the seafloor along the proposed pipeline route gently sloped to the west at a rate of between 0.6 and 1.8 m (2 and 6 feet) per mile (Port Dolphin 2007c). An area of irregular



Source of Bathymetry: NOAA 2000.

Figure 3.4-4. Bathymetry of Proposed Site and Route Alternative

seafloor surface contours was noted in the 18-m (60-foot) water depth range. Here, undulations in the bottom showing relief of 0.6 to 0.9 m (2 to 3 feet) are spread over hundreds and sometimes thousands of meters. Due to the presence of this concentrated area of hard bottom observed during the benthic characterization survey and confirmed during the geophysical survey in the area of the 18-m (60-foot) water depth range (approximately the league line), north-south transects were performed 3 NM north and 3 NM south of the survey corridor during the geophysical survey to determine if a gap was present in the hard-bottom area. Initially it appeared as if a gap did exist, but once additional east-west transects were run over the apparent gap, additional hard-bottom signatures were observed. The results of this additional survey indicated that no "gap" was present in this hard-bottom feature (Port Dolphin 2007c).

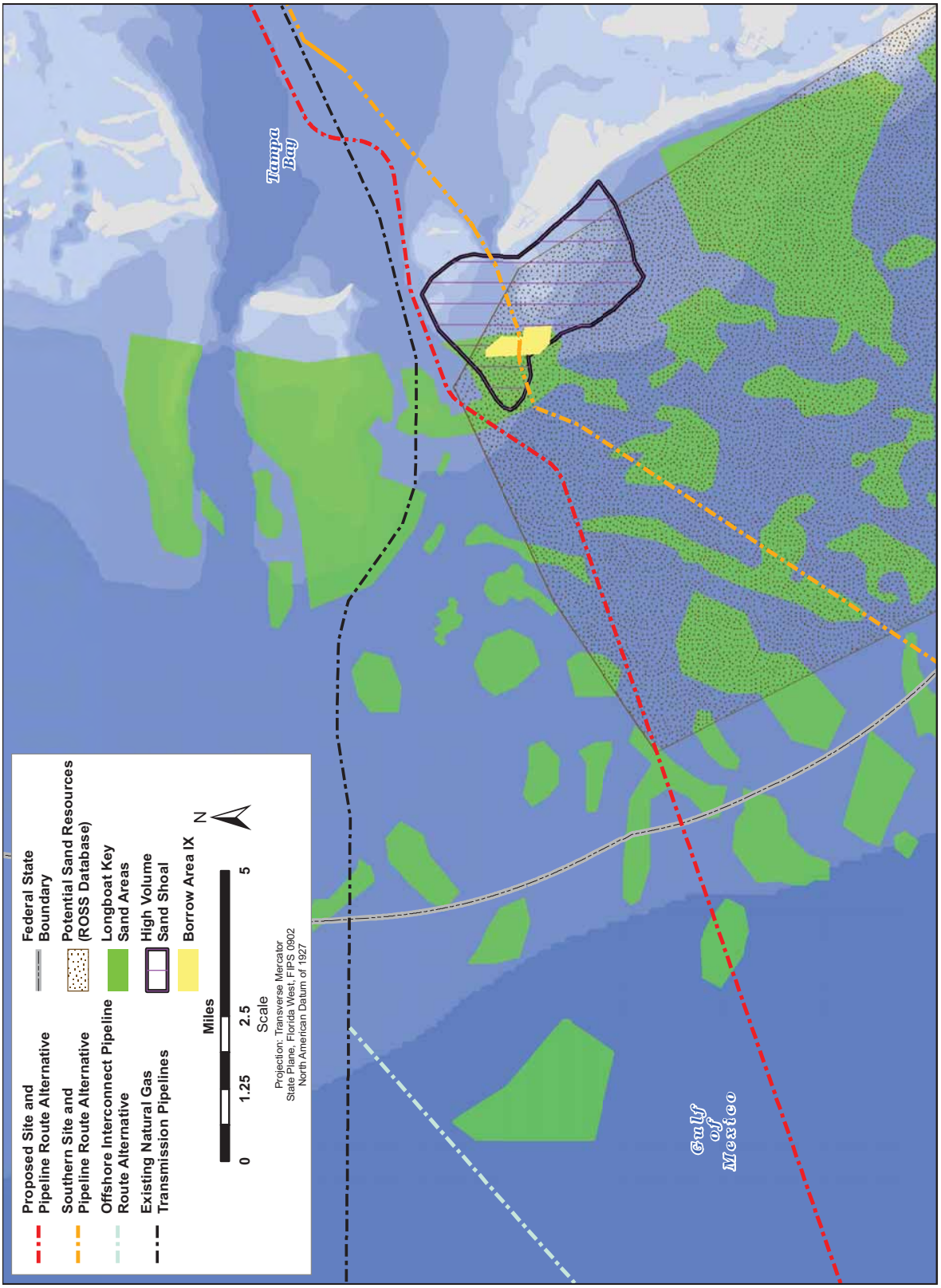
No discernable seafloor features were observed in the geophysical survey at the specific buoy or locations within the mooring area that would be an impediment to their placement. Along the specific pipeline route the seafloor appears free of any obstacles (T. Baker Smith 2007).

The following summary of findings is based on the high-resolution geophysical survey conducted on the proposed site and pipeline route, and is taken directly from the survey report.

- The water depths along the proposed pipeline range between 1.83 and 30.48 m (6 and 100 feet). The majority of the seafloor is relatively flat, with minor undulations associated with migrating sands and shell hash.
- The geophysical survey showed one man-made structure that would have to be avoided: the Gulfstream Natural Gas System 36-inch gas pipeline.

Sand Resources. The suitability of sand for beach renourishment or restoration is dependent on matching the quality of the existing sand to the source sand, and providing the proper mechanical properties to ensure that the beach is stable. Parameters considered for suitability include grain size, mineral content, and color and content of fine sediments. Beach renourishment borrow areas are permitted by the FDEP Bureau of Beaches and Coastal Systems. To receive a permit, the applicant must demonstrate that the area is suitable for beach renourishment both in sand quality and stability, and that the environmental consequences of dredging the borrow area would be acceptable. Currently Borrow Area IX is the only area permitted along the proposed pipeline route.

Potential and current sand resource areas along the proposed pipeline route were determined based on results of the Port Dolphin Pipeline Offshore Geotechnical Investigation-Sand Source Re-Route Survey and the ROSS project and associated database. Additional information on potential and current sand resources was provided in comments submitted by the Town of Longboat Key (Longboat Key 2008), and Manatee and Sarasota counties (Manatee County 2008, Sarasota County 2009). This information included a survey conducted for the Town of Longport Key by Coastal Planning & Engineering, Inc. Information was also provided by FDEP. This information included details on an active sand borrow area permitted by the Town of Longboat Key and identified as Borrow Area IX. This area is approximately 264 acres. An area referred to as the High Volume Sand Shoal, which includes Borrow Area IX, was also identified. This area covers approximately 4,500 acres. The survey information provided by the Town of Longboat Key identified approximately 25 additional areas with potential as future sand borrow areas. These areas have not been fully investigated, and therefore cannot be confirmed to contain beach quality sand resources. These areas include a total of approximately 125,000 acres. Finally, the ROSS-identified area totals approximately 538,000 acres, but this area has also not been fully investigated to determine how much of the area would be suitable for beach nourishment and restoration. **Figure 3.4-5** shows known and potential sand source areas along the proposed and southern pipeline routes.



Source of Proposed Piplines, Florida Gas Transmission Pipeline, and Existing Sand Resources: ConShelf 2007. Source of ROSS Potential Sand Source Area: ConShelf 2008. Source of Borrow Area IX and High Volume Sand Shoal: ConShelf 2009.

Figure 3.4-5. Known and Potential Sand Source Areas Crossed by the Proposed Pipeline Route and Alternatives

Subbottom data profiles collected along the currently proposed pipeline route through the ROSS database potential sand source area indicated that the thickness of the surficial sands vary between a maximum of 5.33 m (17.5 feet) and a minimum of 5 cm (2 in). The maximum thickness occurred only in one or two isolated sites and, similarly, there were areas where no sand cover was discernable on the data at all. The general average is between 1.14 m (3.75 feet) and approximately 2.9 m (9.5 feet). These numbers are estimates based on measuring amorphous pockets observed above the ambient seabed, while variations could exist within the survey area (Port Dolphin 2008a).

In January 2009, MMS published NTL 2009-G04 (MMS 2009a). The NTL refers to an online database that identified Significant OCS Sand Resources in the GOM. The database does not identify any sand resources in the Project area, including the proposed or alternative pipeline routes. (MMS 2009a).

Geologic Hazards. Primary geologic hazards to the pipeline could include the following:

- Buried or sediment-filled river channels
- Karst solution basins
- Sand waves
- Hard-bottom areas showing topographic relief (FERC 2001b).

Potential geologic hazards generally can include the following:

- Ground failure caused by unstable soils (liquefaction)
- Karst terrain/ground subsidence (unexpected formation of sinkholes)
- Seismicity (earthquakes)
- Volcanism
- Shallow gas (e.g., pockmarks and acoustic blanking)
- Competency of bedrock and sediments
- Human activities (mining and existing infrastructure).

Based on geologic and morphologic conditions in Tampa Bay, the potential hazards identified for the Port Dolphin pipeline include seismicity, karst basins, and human activities. These potential hazards are discussed below.

There is a low likelihood of soil/sediment liquefaction, volcanism, shallow gas, or landslides at the Project site. There are no faults beneath the Project site or abrupt topographic differences capable of creating landslides. There is a low likelihood for seismic activity at the Project site; the USGS Seismic Risk Map of Florida shows the proposed pipeline route is located in Zone 0, meaning there is no expected damage from an earthquake (USGS 2008).

Based on topographic maps, aerial imagery, and record reviews, human activities include inactive mining operations within the Project area.

The geophysical survey revealed a number of anomalies, some of which had a particular signature, such as a linear feature that is likely a utility corridor, or artificial reefs associated with the Sunshine Skyway Fishing Pier. In some cases, vague anomalies resembled filled channels, occurring at depths between 1.5 and 6 m (5 and 20 feet) below the seafloor. These features could be sinkholes; however, the features appeared stable, as though these systems had completed developmental processes. These channels could instead be a result of sea level rising and falling during the late Pleistocene and early Holocene (T. Baker Smith 2007).

The geophysical survey did not identify any faults or any other geologic hazard within the survey area.

3.4.3.1 Southern Site and Route Geology

A high-resolution geophysical survey of the Southern Port Site and Route Alternative was conducted in November 2007 by T. Baker Smith, Inc., under contract with Höegh LNG (Port Dolphin 2008a). One line down the centerline of the proposed Southern Route and two parallel lines 100 m to each side of the centerline were surveyed. In the buoy mooring area, 10 lines at a spacing of 300 m were surveyed to cover the entire area of anchoring for the buoy system. Survey equipment included side-scan sonar, an echo sounder to record water depths, a magnetometer to detect ferrous metal objects, and a subbottom profiler used to define shallow variations in sub-surface seabed sediments, shallow fault lines, and gas pockets (Port Dolphin 2008a).

Fathometer data collected during the survey reflect a slightly irregular seabed with minor depressions and slight topographic highs associated with sand accumulations. The seabed appears as an irregular surface interrupted by sandy accumulations and suspected hard-bottom areas and depressions. These irregularities could result from remnant shoals, which formed shortly after the last sea transgression of the area. Most of the features only affect the ambient seafloor by less than 2 to 3 feet. However, they extend laterally over several hundred feet. The majority of the seafloor topography as seen on the subbottom profiles is relatively flat with minor undulations associated with migrating bodies of sand and other granular sediments such as shell hash (Port Dolphin 2008a).

Along the specific pipeline route, the seabed slopes smoothly to the west at an average rate of between 2.1 and 2.5 feet per mile. The fathometer data did not show any evidence of topographic anomalies that could adversely influence the construction or lifetime operation of the proposed pipeline and mooring buoy structures (Port Dolphin 2008a).

Side-scan sonar data which was collected on each of the survey lines were utilized to map the seafloor reflectivity and any visible obstructions that could affect the construction or installation of the pipeline or buoys. In the mooring area and proposed pipeline route the sonar data displayed a seafloor of varied topographic features and bottom types. The sonar records displayed areas of sandy and suspected hard-bottom seafloor. The hard bottom is believed to consist of bedded calcareous limestone scattered with coral colonies and deposits of shell hash in varying degrees of concentration and extent. Based on the survey data the total percentage of hard bottom is greater for the Southern Route with 40.4 percent occurring along the Southern Route and 16.58 percent occurring along the Preferred Route. The exact classification of the hard-bottom features could not entirely be made based on the side-scan sonar alone. The sandy seafloor areas occurred as widespread deposits of sand with no discernable seafloor irregularities other than sand ridges in some locations (Port Dolphin 2008a).

Considering the known geologic conditions of the west Florida shelf, it is a reasonable assumption that seafloor conditions in the alternative routes are similar to the proposed route (USGS 2001).

The Southern Route would lie between the Egmont Channel waterway and Passage Key to the northern edge of the Terra Ceia AP. It would then turn north towards Manbirdtee Island and reach landfall on the southern side of Port Manatee. The major components of the southern pipeline route include the following:

- Two STL buoys, which would be separated by a distance of approximately 5 km (3 mi) and two flow lines that connect to the transmission line
- The 74 km (46 mi) offshore gas transmission line.

Once the pipeline makes landfall at Port Manatee, the pipeline would follow the proposed onshore route with one exception. The Southern Route Alternative would cross CSX railroad and U.S. Highway 41 before turning south along the eastern side of Highway 41 where it then follows the Proposed Route to the interconnection station.

Sediments. As with the proposed route, sediment cover can be more than 4 m (13 feet) thick offshore, corresponding with higher topographic relief of sand waves or ridges. The Tampa Bay ebb-tide delta can move sediment up to 10 km (6 mi) offshore. The cause of the ridges has not been determined. In deeper areas of the shelf, Holocene sediment thins out and the substrate changes into extensive hard bottom or sediment veneers. These hard-bottom features are present in the Southern Route Alternative (see **Appendix F2, Maps 1-7)**.

Sand Resources. Potential and current sand resource areas along the Southern Site and Route Alternative were determined from the same sources discussed in **Section 3.4.3**. **Figure 3.4-5** shows known and potential sand source areas along the Southern Route alternative. Sub-bottom data profiles collected along the currently proposed pipeline route through the ROSS database potential sand source area indicated that the thickness of the surficial sands vary between a maximum of 5.33 m (17.5 feet) and a minimum of 5 cm (2 in). The maximum thickness occurred only in one or two isolated sites and, similarly, there were areas where no sand cover was discernable on the data at all. The general average is between 1.14 m (3.75 feet) to approximately 2.9 m (9.5 feet). These numbers are estimates based on measuring amorphous pockets observed above the ambient seabed, while variations could exist within the survey area. The same average sand thicknesses were assumed for the Southern Route Alternative (Port Dolphin 2008a).

Geologic Hazards. For both the proposed and alternative route, in general, primary geologic hazards to the pipeline include the following:

- Buried or sediment-filled river channels
- Karst solution basins
- Sand waves
- Hard-bottom areas showing topographic relief (FERC 2001b).

There is a low likelihood of sediment liquefaction, volcanism, shallow gas, or landslides at the Project Site. There are no faults beneath the Project Site or abrupt topographic differences capable of creating landslides. There is a low likelihood for seismic activity at the Project site; the USGS Seismic Risk Map of Florida shows the proposed pipeline route is located in Zone 0, meaning there is no expected damage from an earthquake (USGS 2008).

Based on topographic maps, aerial imagery, and record reviews, human activities include active and inactive mining operations within the Project area. Areas along and in proximity to the southern pipeline route could be candidate sites for future mining of sandy sediments.

3.4.3.2 Offshore Gulfstream Pipeline Interconnect

Detailed information about seafloor conditions are only available for the proposed pipeline route (however, portions of the alternative routes do overlap with the path of the proposed route). Considering the known geologic conditions of the west Florida shelf, it is a reasonable assumption that seafloor conditions in the alternative routes are similar to the proposed route (Port Dolphin 2007c).

The Offshore Gulfstream Pipeline Interconnect would extend to the northeast from the location of the proposed buoy site for approximately 28.8 km (18 mi) were it would connect into the existing Gulfstream Pipeline. The major components of the Offshore Gulfstream Pipeline Interconnect include the following:

- Two STL buoys, which would be separated by a distance of approximately 5 km (3 mi) and two flow lines that connect to the transmission line
- The 28.8-km (18-mi) offshore gas transmission line.

No additional new onshore gas transmission line would be constructed in association with the Offshore Gulfstream Pipeline Interconnect.

Sediments. As with the proposed route, sediment cover can be more than 4 m (13 feet) thick offshore, corresponding with higher topographic relief of sand waves or ridges. The Tampa Bay ebb-tide delta can move sediment up to 10 km (6 mi) offshore. The cause of the ridges has not been determined.

In deeper areas of the shelf, Holocene sediment thins out and the substrate changes into extensive hard bottom or sediment veneers. The Offshore Gulfstream Pipeline Interconnect route does not pass through any permitted or proposed borrow sites.

Geologic Hazards. For both the proposed route and Offshore Gulfstream Pipeline Interconnect route, in general, primary geologic hazards to the pipeline include the following:

- Buried or sediment-filled river channels
- Karst solution basins
- Sand waves
- Hard-bottom areas showing topographic relief (Port Dolphin 2007c).

There is a low likelihood of soil liquefaction, volcanism, shallow gas, or landslides at the Project Site. There are no faults beneath the Project Site or abrupt topographic differences capable of creating landslides. There is a low likelihood for seismic activity at the Project site; the USGS Seismic Risk Map of Florida shows the proposed pipeline route is located in Zone 0, meaning there would be no expected damage from an earthquake (USGS 2008).

Based on record reviews, human activities include an ODMDS located approximately 1.2 km (0.75 m) southeast of the gas transmission line alignment.

3.4.3.3 FSRU Geology

The location of the FSRU and gas transmission line is the same as the STL Buoys and transmission line for the proposed Site. See the discussion of geologic and soil conditions described under the proposed Site in **Section 3.4.3** for a description of existing conditions under the FSRU alternative.

3.4.4 Terrestrial Geology

Geologic Setting. Soil and geological resources were analyzed along the proposed pipeline route between the mean high water mark at Port Manatee and its termination at the interconnection station. The onshore pipeline route is approximately 6.4 km (4 mi). Land surface elevations along the onshore route increase from Port Manatee at between 7 to 9 feet (2.1 to 2.7 m) to the interconnection station at between 7.6 to 9 m (25 to 30 feet) National Geodetic Vertical Datum (Port Dolphin 2007b).

The proposed pipeline lies entirely within the Southern Gulf Coastal Lowlands, a physiographic District of Miocene and Pliocene sediments with thin or nonexistent Quaternary deposits. Topography within this area is largely controlled by a series of marine terraces formed during the Pleistocene Era when the sea level was above its present level. In the vicinity of the proposed pipeline route these terraces are relatively flat and poorly drained (Brown 1983).

The regional geology of western Manatee County comprises a stratigraphy of a few tens of feet of surficial sands, shell, and clayey sands overlying several hundreds of feet of limestone and dolomite. Specifically, the geologic sequence in ascending order from Eocene to Recent Age consists of the Middle Eocene Age Avon Park Formation, Upper Eocene Ocala Limestone, Oligocene Age Suwannee Limestone, Miocene Age Hawthorn Group, and Plio-Pleistocene to Recent Age undifferentiated surficial soils (Scott 1990).

The oldest formation of interest in the study area is the Middle Eocene Avon Park Formation. The Avon Park Formation consists of interbedded limestone and dolomite. The limestones range from a white to brown, soft to hard, fine to granular, fossiliferous limestone. The dolomites are light to dark brown, hard, microcrystalline to crystalline dolomite. The formation is greater than 213 m (700 feet) thick and very permeable (Scott 1990).

The Upper Eocene Ocala Limestone unconformably overlies the Avon Park Formation. The upper zones of the formation consist of white to light gray, soft, friable, chalky, highly fossiliferous, silty to granular limestone. Lower zones are more granular, very porous and contain beds of brown and light brown, hard, crystalline dolomite. The formation is approximately 91 m (300 feet) thick and generally lies approximately 595 feet (181 m) below land surface, or approximately 174 m (570 feet) below sea level (Scott 1990).

Suwannee Limestone of Oligocene Age unconformably overlies the Ocala Limestone. The Suwannee Limestone consists of a white to light brown, soft to hard, granular, very fossiliferous, porous limestone with some beds of crystalline dolomite. The top of the formation generally occurs 61 m (200 feet) below land surface or 113 m (370 feet) below sea level. Numerous interconnected solution cavities exist within the Suwannee Limestone (Scott 1990).

The Hawthorn Group unconformably overlies the Suwannee Limestone and is composed of the Arcadia Formation and overlying Peace River Formation. The lower part of the Arcadia Formation consists of the Tampa Member. The Nocatee Member of the Hawthorn Formation is eroded away in the vicinity of the proposed Pipeline route. The Tampa Member (locally referred to as the "Tampa Limestone") consists of white, gray, and brown, hard, dense, sandy, locally phosphatic, fossiliferous limestone displaying relatively high permeabilities due to interconnected solution features. The Tampa Member is the major producing zone of the intermediate aquifer system. The top of this member is approximately 82 m (270 feet) below land surface or 75 m (245 feet) below sea level (Scott 1990).

The Arcadia Formation (undifferentiated) of the Hawthorn Group consists of light gray and brown, sandy, phosphatic, calcareous hard clay and claystone overlying light gray and brown, sandy, phosphatic, dolomitic limestone with minor layers of sand, clay, and phosphate. The top of the Arcadia Formation is a dissected, irregular, erosional surface. Impervious deposits within the Arcadia formation act as confining beds for the underlying major producing zone of the intermediate aquifer system. The top of the Arcadia Formation is approximately 12 m (40 feet) below land surface, and it has an approximate thickness of 82 m (230 feet). The Peace River Formation of the Hawthorn Group, composing the lower part of the surficial aquifer system, unconformably overlies the Arcadia Formation, and consists of phosphatic clayey sand and sandy clay, which are typically mined for their phosphate. Although the

formation is clayey, it is relatively pervious. The top of the formation occurs at 3 to 6 m (10 to 20 feet) below land surface and is up to 9 m (30 feet) thick (Scott 1990).

Aboveground Facilities. Soil and geological resources were analyzed along the onshore pipeline route between the mean high water mark at Port Manatee and its termination at the interconnection station. The onshore portion of the pipeline would be approximately 6.4 km (4 mi).

The surficial geology in the vicinity of the proposed Interconnection Station, which would have a footprint of approximately 1.2 hectares (3 acres), consists of undifferentiated surficial soils, classified as Cassia series fine sand. These sands form in thick deposits of marine sands consisting of somewhat poorly drained to moderately well-drained soils, and grade into the Plio-Pleistocene Peace River Formation, consisting of sand, clay, and clayey sand (Hyde and Huckle 1983).

Blasting. No blasting is expected to be necessary along the proposed pipeline route. The Bradenton fine sand/limestone substratum might contain unweathered limestone from 111 to 195 cm (44 to 77 inches) below land surface. The unweathered limestone is expected to be discontinuous and is not likely to require blasting (Port Dolphin 2007l).

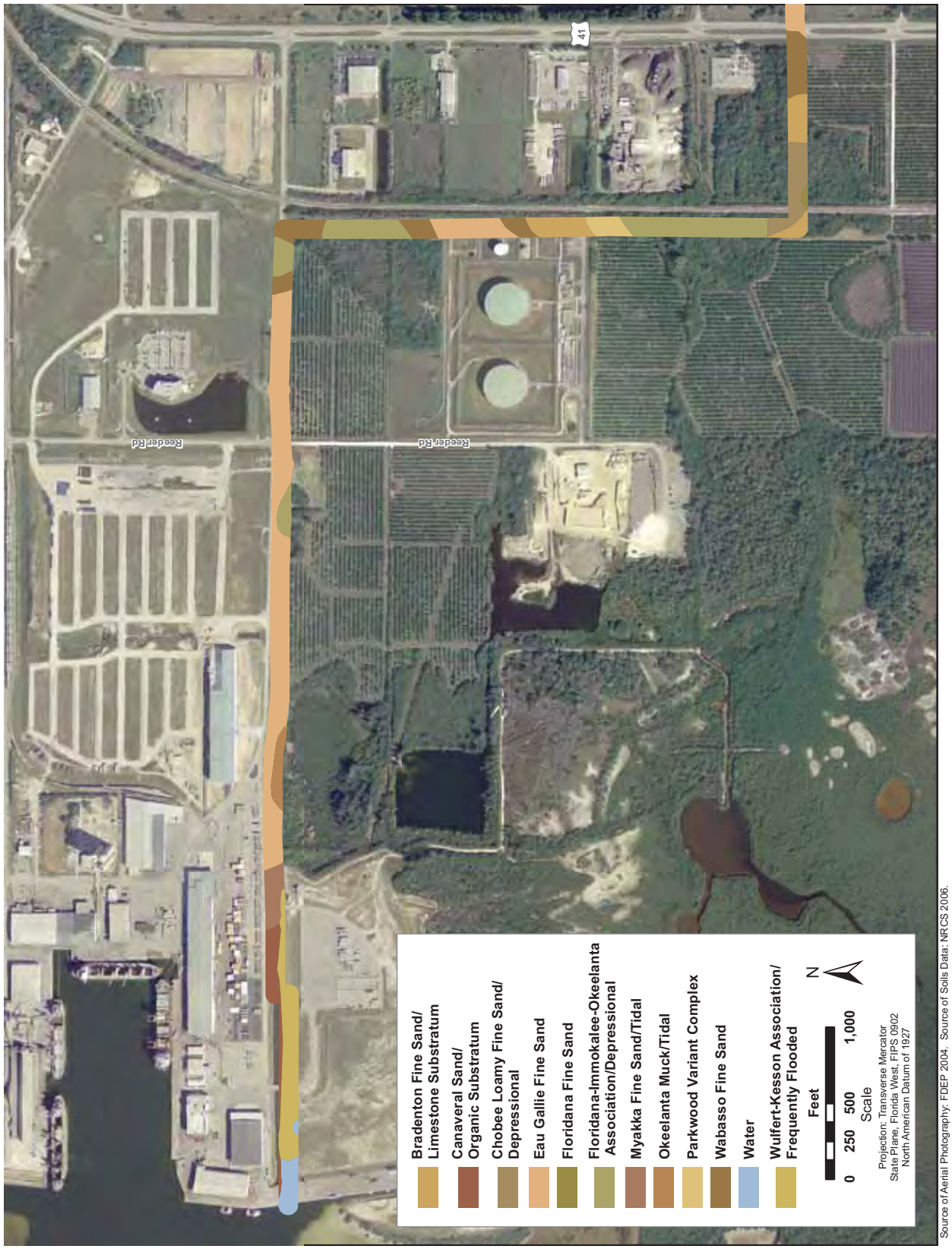
Mineral Resources. Based upon recent aerial imagery, and the Cockroach Bay 7.5-minute series USGS topographic quadrangle, there are three inactive sand pits along the proposed pipeline route. The first inactive mining area is approximately 219 m (279 feet) from the construction ROW, the second is approximately 441 m (1,450 feet) from the construction ROW, and the third inactive mining area is approximately 12 m) from the construction ROW (Port Dolphin 2007l).

The Manatee County Environmental Management Department records show that active mining permits have been issued for the land south of the proposed pipeline, between FM 233,278 and FM 236,793, 37 m (120 feet) south of the construction ROW. Another mining permit has been issued for property on the west side of Grass Farm Road approximately 90 m (3,250 feet) north of Buckeye Road and the proposed pipeline route. In addition, vacant land south of the proposed pipeline route has potential for the mining of sandy soils (Port Dolphin 2007l).

Soils. Existing onshore sediments are composed of carbonate-rich Canaveral sands of marine origin which grade into the Wulfert-Kesson association of poorly drained rapidly permeable soils, associated with mangrove swamps. NRCS soil maps show the first several hundred feet of proposed pipeline as water. Based on the review aerial of photography, these areas have been reworked and are now referred to as Altered Land in this report.

Soils occurring along the onshore portion of the proposed pipeline route are shown in **Figures 3.4-6** and **3.4-7,** and listed in **Table 3.4-3**. The majority of soils encountered along both the proposed pipeline routings belong to the B/D or D hydrologic soil group. Hydrologic soil group B/D indicates the classification with improved drainage. Approximately 50 percent of the Project area is composed of EauGallie series soils. EauGallie soils are poorly drained soils formed with thick beds of sandy and loamy marine sediments (Hyde and Huckle 1983).

Aboveground Facility Soils. Soils mapped in the area of the Port Manatee valve station include the Wulfert and Kesson series. The Wulfert series is very deep and very poorly drained with rapid permeability. The Kesson series is deep and very poorly drained with a rapid to moderately rapid permeability. The Wulfert and Kesson series under natural conditions are flooded during normal daily high tides. The soils at this site were probably altered when the Port was developed (Hyde and Huckle 1983). The Port Manatee valve station would encompass 0.028 hectares (0.07 acres).



Source of Aerial Photography: FDEP 2004. Source of Soils Data: NRCS 2006.

Figure 3.4-6. Soils Along the Proposed Route at Landfall

Source of Aerial Photography: FDEP 2004. Source of Soils Data: NRCS 2006.

Figure 3.4-7. Soils Along the Proposed Onshore Route

Table 3.4-3. Soil Classifications

Soil Mapping Unit	Drainage Class	Hydrologic Group
Altered Land	-	-
Bradenton fine sand/limestone substratum	Poorly drained	B/D
Canova, Anclote, and Okeelanta soils	Very poorly drained	B/D
Cassia fine sand	Moderately well-drained	C
Chobee Loamy fine sand	Very poorly drained	D
EauGallie fine sand	Poorly drained	B/D
Floridana-Immokalee-Okeelanta association	Very poorly drained	D
Myakka fine sand, tidal	Very poorly drained	D
Okeelanta muck, tidal	Very poorly drained	D
Palmetto sand	Poor or somewhat poorly drained	B/D
Parkwood Variant complex	Poor or somewhat poorly drained	B/D
Wabasso fine sand	Poor or somewhat poorly drained	B/D
Wulfert-Kesson association	Very poorly drained	D

Source: Hyde and Huckle 1983

Notes:

B. The soils have a moderate infiltration rate when thoroughly wetted. They chiefly are moderately deep to deep, moderately well-drained to well-drained soils that have moderately fine to moderately coarse textures. They have a moderate rate of water transmission.

C. The soils have a slow infiltration rate when thoroughly wetted. They chiefly have a layer that impedes downward movement of water or have moderately fine to fine texture. They have a slow rate of water transmission.

D. The soils have a very slow infiltration rate when thoroughly wetted. They chiefly consist of clay soils that have a high swelling potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. They have a very slow rate of water transmission.

Note: Dual hydrologic groups, B/D, and C/D, are given for certain wet soils that can be adequately drained. The first letter applies to the drained condition, the second to the undrained. Only soils that are rated D in their natural condition are assigned to dual classes. Soils can be assigned to dual groups if drainage is feasible and practical.

The Cassia fine sand is mapped in the area of the proposed Interconnection Station. The Cassia fine sand forms in thick deposits of marine sands and consists of somewhat poorly drained to moderately well-drained soils with moderate to moderately rapid permeability. Without drainage improvement, the seasonal high water table is 38 to 101 cm (15 to 40 inches) below land surface. The Gulfstream Interconnection Station would encompass approximately 1.2 hectares (3 acres) (Port Dolphin 2007b).

Geologic and Soil Hazards. As with the proposed route and each alternative route, in general, primary potential geologic hazards to the terrestrial pipeline could include the following:

- Siesmic hazards
- Active faults
- Soil liquifaction
- Landslides
- Karst terrain/land subsidence.

There is a low likelihood for seismic activity in the Project area; the USGS Seismic Risk Map of Florida shows the pipeline routes are located in Zone 0, meaning there is no expected damage from an earthquake. The USGS Earthquake Probability Mapping tool identifies the pipeline routes as having between a 0.006 and 0.007 probability of a magnitude 4.75 occurring in the next 50 years. No known active faults exist within the State of Florida (USGS 2008).

Soil liquefaction typically occurs in saturated sediments due to earthquake activity. Because of the low probability of earthquakes occurring in the region of the pipeline routes, the likelihood of earthquake-induced liquefaction is not a concern. Due to the flat nature of the topography around the proposed pipeline routes, landslides are also not anticipated (Port Dolphin 2007c).

The USGS classifies all of Manatee County as an area where sinkholes are few, but large diameter and deep sinkholes can occur. Based on the Florida Geological Survey Sinkhole Database there are four known recent sinkholes in Manatee County; two have been documented within 16 km (10 miles) of the pipeline routes (Port Dolphin 2007c).

3.5 Marine Areas and Land Use

3.5.1 Definition of the Resource

The terms marine areas and land use refer to real property classifications that indicate either natural conditions or the types of human activities occurring or permitted within a defined area in the water, or within or adjacent to a parcel of land.

The OCSLA, as amended, defined the OCS, and authorized regulations to conserve OCS resources, including the exploration, development, and production of mineral resources, and other activities on the OCS. Within Federal waters of the GOM, functional land use is regulated through MMS with lease blocks and ROW permits for defined OCSLA activities. Other functional uses for the GOM include military warning areas, shipping lanes and anchorages, alternate energy uses on the OCS, and dredge disposal areas. Congress enacted the CZMA in 1972 to encourage states to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs; and fish and wildlife that use those habitats. As such, the State of Florida would require that the Proposed Action meet their CZMA consistency certification (15 CFR 930.57) for Federal permitting.

Onshore, land use planning is done by Federal, state, and local planning and zoning entities. Functional uses for land in Florida include wetlands and waterbodies, agriculture, roads and utility ROWs, commercial and industrial lands, and residential areas. The main objectives of land use planning are to ensure orderly growth and compatible uses among adjacent parcels or areas. Compatibility among land uses fosters the societal interest of obtaining the highest and best uses of real property. Tools supporting land use planning include written master plans, management plans, and zoning regulations.

The Proposed Route and Southern Route alternatives are evaluated for their potential to affect the Project sites and adjacent marine and land uses both. The foremost factor affecting the use of the area is compliance with existing functional uses, regulations, and zoning plans. Other relevant factors include matters such as existing land uses on adjacent sites, the duration of a proposed activity, and its permanence as a change in marine activities or land use.

3.5.2 Marine Areas

Activities in the GOM define the way areas are designated. Shipping activities, commercial and recreational fishing, USACE and other Department of Defense (DOD) activities, and MMS mineral leasing activities are prominent in the OCS of the GOM. There are also man-made and naturally occurring land uses in the GOM that include artificial reefs created by man-made structures, biologically sensitive areas, and topographic features. As such, areas of the OCS have been designated to accommodate all these major activities and resources. Port Dolphin and its offshore pipelines would traverse through or near the following land uses and area designations in Federal and state waters:

- Inactive Lease Blocks (managed by MMS for oil, natural gas, alternate energy uses on the OCS, and mineral production)
- Transportation Waterways (for maritime shipping and traveling)
- Dredged Material Disposal Areas (managed collectively by the USACE and Port Authorities)
- Coastal Zone Management Areas (for the protection and enhancement of state coastal areas).

3.5.2.1 Lease Blocks

MMS does not currently lease any blocks in the Tampa Bay area or northeastern GOM for the exploration of oil and gas resources. It is possible that MMS could lease the blocks traversed by the Project should a license be granted and the lease blocks receive a bid (see **Figure 2.3-4**). Due to the GOM Energy Security Act of 2006, these blocks would not become available for an OCS Lease Sale until after June 30, 2022. A lease sale is the process where the rights to explore for oil and gas resources are conveyed to qualified bidders. The process begins with a NEPA review for each oil and gas Lease Sale and ends with a public reading of sealed bids.

3.5.2.2 Transportation Safety Fairways

The purpose of shipping safety fairways and anchorage areas is to control the erection of structures along designated pathways in order to provide safe approaches for vessels traversing the GOM to entrances of major ports along the Gulf Coast. A shipping safety fairway is a lane or corridor in which no artificial island or fixed structure, temporary or permanent, will be permitted. The main shipping channel, Egmont waterway, and Port Manatee waterway shipping fairways are in the vicinity of the Project, as shown in **Figures 2.3-1** and **2.3-2**.

3.5.2.3 Ocean Dredged Material Disposal Areas

In 1972, Congress enacted the MPRSA, also known as the Ocean Dumping Act, to prohibit the dumping of material into the ocean that would unreasonably degrade or endanger human health or the marine environment. Virtually all material that is ocean-dumped today is dredged material (sediments) removed from the bottom of waterbodies to maintain navigation channels and berthing areas. Other materials that are currently ocean-disposed include fish wastes, human remains, and vessels (USEPA 2006).

Ocean dumping cannot occur unless a permit is issued under the MPRSA. In the case of dredged material, the decision to issue a permit is made by the USACE, using USEPA's environmental criteria and subject to USEPA's concurrence. For all other materials, USEPA is the permitting agency. USEPA is also responsible for designating recommended ocean-dumping sites for all types of materials (USEPA 2006). Currently, there is one ODMDS in the Project vicinity, and several spoil sites for waterway maintenance. These sites are depicted on **Figure 2.3-1**.

3.5.3 Coastal Zone Management Areas

The national Coastal Zone Management Program (CZMP) is authorized by the CZMA of 1972 and administered at the Federal level by the Coastal Programs Division (CPD) within the NOAA Office of Ocean and Coastal Resource Management. The State of Florida has a federally approved coastal management program, and the FDEP is responsible for directing the implementation of the statewide coastal management program (FDEP 2006a).

The Coastal Use Permit Program, managed by the FDEP, seeks to protect and sustain Florida's natural, cultural, historical, and economic coastal resources and communities. The Florida Coastal Management Program (FCMP) activities are implemented in partnership with FCMP network agencies through program support projects, and coordinated reviews of Federal activities for consistency with the statutory authorities in the FCMP. FDEP is responsible for directing the implementation of the FCMP.

The Applicant has completed a Federal consistency certification to describe how the Port Dolphin project complies with the policies of the CZMP. It is expected that the State of Florida would provide a concurrence, objection, or request for an extension relative to the Proposed Action after the publication of the Final EIS. The State of Florida would either concur or object to the certification and analysis.

3.5.4 Land Use

There is no nationally recognized uniform terminology for describing land use categories, but the State of Florida has developed the FLUCCS (FDOT 1999). The following general land use categories are located in the Project area: agricultural lands, wetlands, urban land, and residential lands.

ROW Collocation. The Port Dolphin routes have been designed to use existing utility corridors to the best extent possible. Port Dolphin Energy LLC intends to use a construction ROW of 100 feet, and an operation ROW of 30 feet. By collocating with other utilities, land use easements can be overlapped, thus reducing the overall footprint of the linear project. Where collocated with another utility, the ROW would be reduced by 15 feet. The Applicant would follow the FERC Plans and Procedures (see **Section 2.3.9**) during construction and operation of the onshore portion of the pipeline. This would include BMPs for erosion control.

Acquiring Land. Port Dolphin Energy LLC would obtain easements from landowners to construct its pipeline. The easement would allow Port Dolphin Energy LLC to construct, operate, and maintain the pipeline ROW. The easement between the landowner and Port Dolphin Energy LLC typically specifies compensation for the loss of use during construction. The acquisition of an easement is a negotiable process that would be carried out between Port Dolphin Energy LLC and individual landowners. However, if the onshore portion of the Project is approved by the FERC Commission, that approval conveys with it the right of eminent domain. Therefore, if easement negotiations fail to produce an agreement, Port Dolphin Energy LLC could initiate condemnation proceedings in accordance with Florida state law.

3.6 Recreation and Aesthetics

3.6.1 Definition of the Resource

Recreational resources include areas and infrastructure designated by local, state, and Federal planning entities to offer visitors and residents diverse opportunities to enjoy leisure activities. Recreational resources are those places or amenities set aside as parklands, beaches, trails (e.g., hiking, skiing,

bicycling, equestrian), recreation fields, sport and recreational venues, open spaces, and a number of other locales. National, state, and local jurisdictions typically have designated land areas with defined boundaries for recreation. Other less-structured activities, for example, hunting or cross-country skiing, are performed in broad, less-defined locales. A recreational setting might consist of natural or human-made landscapes and range in size from a roadside monument to a multimillion-acre wilderness area.

Visual resources are defined as the natural and man-made features that give a particular setting or area its aesthetic qualities. These features define the landscape character of an area and form the overall impression that an observer receives of that area. Evaluating the aesthetic qualities of an area is a subjective process because the value that an observer places on a specific feature varies depending on his/her perspective. For example, an engineer might appreciate the span of a bridge or a causeway, while a geologist might appreciate the exposure of a particular sequence of strata in a road cut. In general, a feature observed within a landscape can be considered as "characteristic" (or character-defining) if it is inherent to the composition and function of the landscape. Landscapes do change over time, so the assessment of the environmental impacts of a proposed action on a given landscape area must be made relative to the "characteristic" features currently composing the landscape or area.

Visual resources within the coastal waterway environment can include both man-made and natural features. In urban settings, man-made features dominate the landscape; while in rural settings, natural features dominate. Examples of natural visual resources that might occur along coastal areas would include landforms such as beaches, marshes, estuaries, wetlands, and coastal riffs. Within more urban settings, natural features might include parks and other green spaces, or waterfalls and ponds associated with milling operations. Examples of man-made features with dominantly natural landscapes might include farmsteads (houses and outbuildings), bridges, causeways, jetties, ports, wharves, piers, lighthouses, canals, docks, and historic forts or fortifications (intact or ruins).

3.6.2 Existing Conditions

Coastal Recreation and Viewing Areas. Florida recreation is centered on boating, beaches, and natural areas. Popular coastal recreation and viewing areas include the Terra Ceia AP in Manatee County, and the Cockroach Bay AP in Hillsborough County. The Terra Ceia AP was established in 1984 and covers approximately 25,786 acres of submerged lands that protect seagrass beds, oyster reefs, and mangroves. Cockroach Bay AP was established in 1976 and was designated as an OFW in 1979. Cockroach Bay AP encompasses approximately 8,583 acres and includes part of the Little Manatee River. Hillsborough Community College Environmental Studies Center is an 18-acre educational facility adjacent to the Cockroach Bay AP.

Boating activities are also very popular along the western coast of Florida. Hillsborough and Pinellas counties have public boat ramps. There are also 15 public marinas throughout the western side of Florida, three of which are in the Tampa Bay area. In addition to the public ramps, there are also several private boat ramps in residential areas. Commercial and recreational boating activities include touring and fishing. There are several boats registered in the vicinity of the Project for private and commercial uses. As outlined in **Table 3.6-1,** there are more than 128,000 private and commercial boats registered in the counties that surround the Project area. **Table 3.6-2** shows the annual landings statistics for the Tampa Bay area in 2006. **Section 3.9**, Socioeconomic Resources and Environmental Justice, will discuss the economics of these activities in the area.

Table 3.6-1. Registered Vessels in Hillsborough, Manatee, and Pinellas Counties, Florida

County	Total Vessels Registered	Commercial Vessels Registered
Hillsborough	48,526	824
Manatee	20,712	610
Pinellas	56,432	1,313
Totals	**125,670**	**2,747**

Source: FWC 2007f, NMFS 2006b, NMFS 2007a

Table 3.6-2. Annual Landings Statistics for Hillsborough, Manatee and Pinellas Counties, Florida in 2006

County	Total Finfish Landed (lbs)	Total Number of Finfish Trips	Total Invertebrates Landed (lbs)	Total Number of Invertebrate Trips
Hillsborough	755,188	1,772	283,703	1,218
Manatee	2,875,807	1,690	229,339	1,590
Pinellas	7,648,903	8,712	906,953	4,764

Source: FWC 2007f , NMFS 2006b, NMFS 2007a

Recreation on Local Islands. The Pinellas County Park system includes both island and aquatic preserves. Honeymoon Island Park is approximately 385 acres in land area with approximately 2,400 submerged acres and 4 miles of beach. Activities include bird watching, picnicking, hiking, fishing, and various other beach activities. Caladesi Island State Park, also within the Pinellas County AR, is composed of six islands with a total of approximately 668 upland acres and more than 2,500 acres of surrounding mangroves, tidal flats, and seagrass beds. Fort De Soto Park is the largest park within the Pinellas County Park System. This park consists of approximately 1,136 acres made up of five interconnected islands. Activities include bird watching, picnicking, hiking, fishing, and various other beach activities. Annual park attendance averages more than 2.7 million visitors. The Egmont State Park is at the mouth of Tampa Bay, and is cooperatively managed by the FDEP, USFWS, and USCG. Primarily a wildlife refuge, it is accessible only by private boat. Recreational activities include swimming, fishing, wildlife viewing, and picnicking.

Onshore Recreational and Viewing Areas. Onshore recreation and viewing areas include the Upper Tampa Bay Park and the Hillsborough River State Park, and the Little Manatee River State Recreation Area. The Upper Tampa Bay Park is in Western Hillsborough County, includes approximately 2,144 acres, and features a 600-acre peninsula on Old Tampa Bay Hillsborough River State Park. The Hillsborough River State Park opened in 1938 as one of Florida's first state parks. This park is divided by the swiftly flowing Hillsborough River. Fort Foster, a replica of an 1837 fort from the Second Seminole War, is located on the park grounds, adjacent to the river. The river provides opportunities for fishing, canoeing, and kayaking; a canoe/kayak launch is available on the river. Other activities include hiking, cycling, camping, and picnicking. Little Manatee River State Recreation Area begins in a swampy area near Fort Lonesome and flows almost 40 miles before emptying into Tampa Bay. The river has been designated an OFW and is part of the Cockroach Bay AP. Activities include fishing, boating, hiking, horseback riding, camping, and picnicking.

3.7 Air Quality

3.7.1 Definition of the Resource

In accordance with Federal CAA requirements, the air quality in a given region or area is measured by the concentration of various pollutants in the atmosphere. The measurements of these "criteria pollutants" in ambient air are expressed in units of ppm, micrograms per cubic meter ($\mu g/m^3$), or milligrams per cubic meter (mg/m^3). The air quality in a region is a result not only of the types and quantities of atmospheric pollutants and pollutant sources in an area, but also surface topography, the size of the topological "air basin," and the prevailing meteorological conditions.

The CAA directed USEPA to develop, implement, and enforce environmental regulations that would ensure clean and healthy ambient air quality. To protect public health and welfare, USEPA developed numerical concentration-based standards, or National Ambient Air Quality Standards (NAAQS), for pollutants that have been determined to affect human health and the environment. USEPA established both primary and secondary NAAQS under the provisions of the CAA. NAAQS are currently established for six criteria air pollutants: ozone (O_3), CO, nitrogen dioxide (NO_2), SO_2, respirable particulate matter (including particulates equal to or less than 10 microns in diameter [PM_{10}] and particulates equal to or less than 2.5 microns in diameter [$PM_{2.5}$]), and lead (Pb). The primary NAAQS are ambient air quality standards of which maintenance is required to protect the public health, with an adequate margin of safety. Secondary NAAQS specify levels of air quality of which maintenance is required to protect the public welfare. This maintenance includes effects of pollution on vegetation, crops, wildlife, economic values, and visibility.

The CAA requires states to designate any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for a criteria pollutant as a nonattainment area. There are currently no areas in the State of Florida designated as nonattainment for any air pollutant. However, on March 7, 2009, FDEP recommended to the USEPA that counties in the Tampa Bay Area, including Pinellas, Hillsborough, Sarasota, and Manatee, be designated as nonattainment for the 8-hour ozone NAAQS, based on 2006–2008 ozone air quality monitoring data for these counties. USEPA is scheduled to make final nonattainment designations for the 2008 8-hour ozone NAAQS in March 2010.

Under the Federal Prevention of Significant Deterioration (PSD) program, Class I areas are assigned to protect Federal wilderness areas such as national parks, where the least amount of air quality deterioration is allowed (see **Section 3.7.3**). The Port would be within 300 km (186 mi) of two Class I areas, the Chassahowitzka NWR, at a distance of 150 km and Everglades National Park at 244 km. USEPA and state agencies generally require PSD sources within a 100-km (62-mi) to 200-km (124-mi) radius of a Class I area to consult with the relevant Federal Land Manager (FLM). Sources farther away could also be required to consult with the FLM, if the source's emissions could potentially impact a Class I area (see **Section 4.7.1**). Factors to be considered include distance to the Class I area, magnitude of emissions, current conditions of air-sensitive resources in the Class I area, potential for source growth in an area or region, prevailing meteorological conditions, and cumulative effects of multiple sources on air-sensitive resources.

A Class I increment analysis must be conducted if air quality modeling predicts ambient air concentrations above the USEPA Class I significance impact levels. In addition, the Applicant must also show that the Port would not have an adverse impact on Air-Quality Related Values (AQRV) in the Class I area. AQRV are scenic, cultural, physical, biological, ecological, or recreational resources that might be affected by a change in air quality, as defined by the FLM.

The USFWS is the FLM for the Chasshowitzka NWR, while the National Park Service (NPS) is the FLM for Everglades National Park. Impacts on air quality and AQRV will be addressed for areas potentially affected by construction activities and the operation of the Port. The location of the Class I areas in relation to the Port is illustrated in **Figure 3.7-1**.

3.7.2 Regulation of Air Quality in Florida

Under the CAA, areas within state boundaries are classified as either attainment, nonattainment, or unclassifiable. An attainment area is an air basin or region that meets or is better than the NAAQS. Nonattainment areas are areas that have air pollutant concentrations that exceed the NAAQS. The air emissions from the construction and operation of the Port would be under USEPA jurisdiction (USEPA Region 4). The criteria pollutants and their impact on health and environmental welfare are discussed in more detail below.

O_3. Emitted pollutants or "O_3 precursors" consist primarily of NO_X and VOCs that are directly emitted from a wide range of emissions sources. For this reason, regulatory agencies attempt to limit atmospheric O_3 concentrations by limiting VOC pollutants (also identified as reactive organic gases) and NO_X.

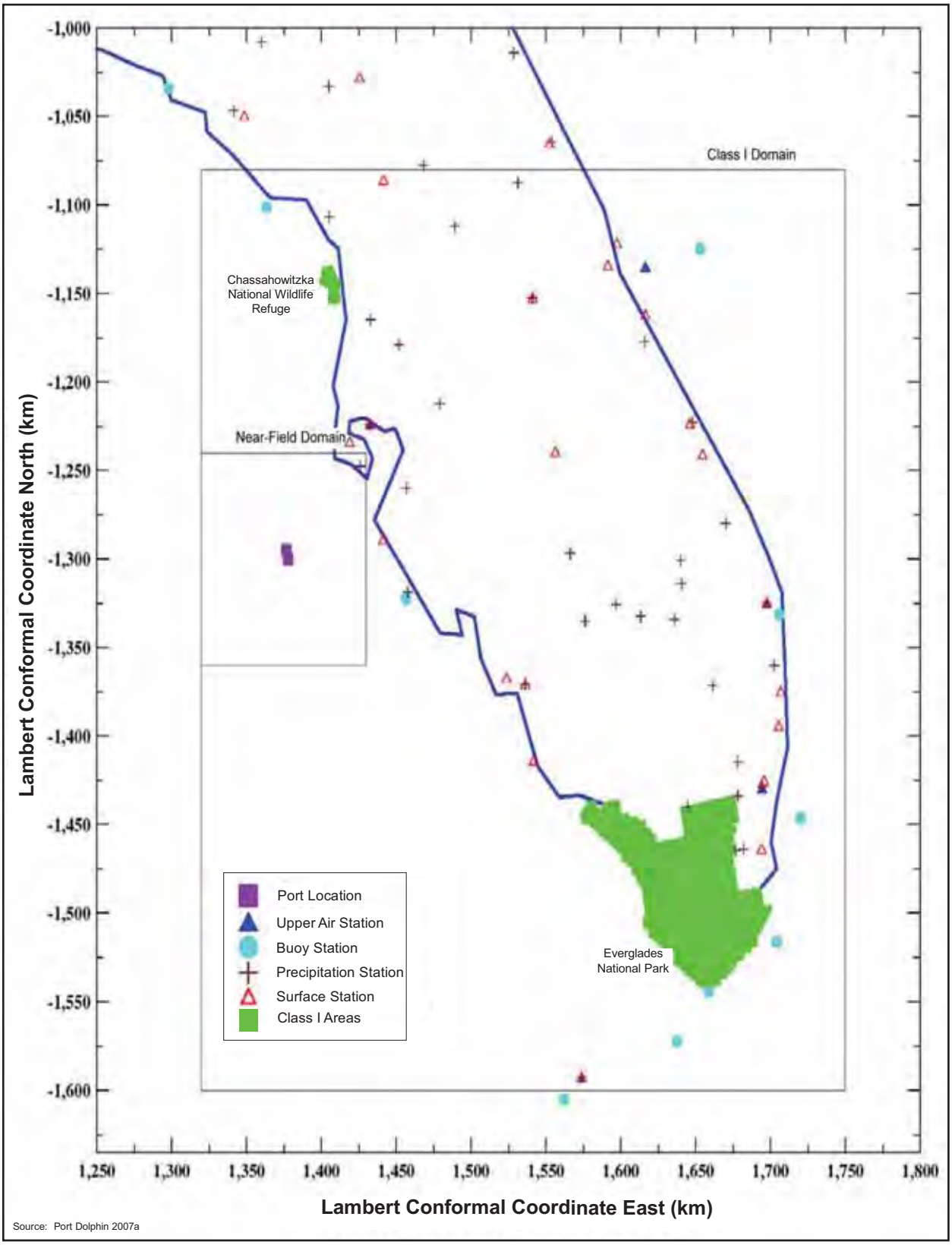
NO_X. NO_X emissions are primarily generated from the combustion of fuels. NO_X includes nitric oxide and NO_2. Because nitric oxide converts to NO_2 in the atmosphere over time and NO_2 is the more reactive of the two, NO_2 is the listed criteria pollutant. It can penetrate deep into the lungs where tissue damage occurs. NO_X is also regulated as a precursor to O_3.

CO. CO is the product of fuel combustion, principally from automobiles and other mobile sources of pollution. The major immediate health effect of CO is that it competes with oxygen in the blood stream and can cause death by asphyxiation. Concentrations of CO in urban environments are usually only a fraction of those levels that cause asphyxiation. Peak CO levels typically occur during winter months due to a combination of higher emissions rates and stagnant weather conditions.

SO_2. SO_2 is produced when any sulfur-containing fuel is burned. It is also emitted by chemical plants that treat or refine sulfur or sulfur-containing chemicals. Health and welfare effects attributed to SO_2 are due to high irritant effects of sulfate aerosols, such as sulfuric acid, which are produced from SO_2.

Particulate Matter. Particulates in the air are caused by a combination of wind-blown fugitive dust; particles emitted from combustion sources (usually carbon particles); and organic, sulfate, and nitrate aerosols formed in the air from emitted hydrocarbons, sulfur oxides, and NO_x. Particulate matter might contribute to the development of chronic bronchitis and might be a predisposing factor to acute bacterial and viral bronchitis. In 1987, USEPA adopted standards for PM_{10} and phased out the total suspended particulate standards that had been in effect until then. In 1997, USEPA adopted emissions standards for $PM_{2.5}$ pollutants, which, due to their size, have been determined by USEPA to lodge deep in lung tissue and cause chronic health impacts.

Pb. Lead exposure can occur through multiple pathways, including inhaling air and ingesting lead in food from water, soil, or dust contamination. Excessive exposure to lead can affect the central nervous system. Lead gasoline additives were a significant contributor to atmospheric lead emissions. Legislation in the early 1970s required gradual reduction of the lead content of gasoline over a period of time, which has dramatically reduced lead emissions from mobile and other combustion sources. In addition, unleaded gasoline was introduced in 1975, and together these controls have essentially eliminated violations of the lead standard for ambient air in urban areas.



Source: Port Dolphin 2007a

Figure 3.7-1. Location of Class I Areas in Relation to Port Dolphin

The FDEP has adopted most of the Federal limits in developing the Florida Ambient Air Quality Standards (FAAQS) promulgated under Chapter 62-204.240 of the F.A.C. For SO_2, the FAAQS for 24-hour and annual averaging times are lower than the NAAQS. **Table 3.7-1** presents the primary and secondary NAAQS and FAAQS.

Table 3.7-1. National and Florida Ambient Air Quality Standards

Pollutant	NAAQS	Florida AAQS	Averaging Time	Primary or Secondary?
Carbon Monoxide	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	8-hour [a]	Primary
	35 ppm (40 mg/m^3)	35 ppm (40 mg/m^3)	1-hour [a]	Primary
Lead	0.15 µg/m^3	N/A	Rolling 3-Month Average	Same as Primary
	1.5 µg/m^3	1.5 µg/m^3	Quarterly Average	Both
Nitrogen Dioxide	0.053 ppm (100 µg/m^3)	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Both
Particulate Matter (PM_{10})	150 µg/m^3	150 µg/m^3	24-hour [b]	Primary
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	15.0 µg/m^3	Annual (Arithmetic Mean) [c]	Both
	35 µg/m^3	35 µg/m^3	24-hour [d]	Primary
Ozone	0.075 ppm (2008 std)	N/A	8-hour	Same as Primary
	0.08 ppm	0.075 ppm	8-hour [e]	Both
	0.12 ppm	N/A	1-hour (Applies only in limited areas)	Both
Sulfur Oxides	0.03 ppm (80 µg/m^3)	0.0225 ppm (60 µg/m^3)	Annual (Arithmetic Mean)	Primary
	0.14 ppm (365 µg/m^3)	0.10 ppm (260 µg/m^3)	24-hour [a]	Primary
	0.5 ppm (1300 µg/m^3)	0.5 ppm (1300 µg/m^3)	3-hour [a]	Secondary

Notes: FAC 1996

a. Not to be exceeded more than once per year.

b. Not to be exceeded more than once per year on average over 3 years.

c. Based on the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors.

d. Based on the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor.

e. Based on the 3-year average of the fourth-highest daily maximum 8-hour average concentrations.

3.7.3 Applicable Regulatory Requirements

The following CAA requirements could apply to construction and operational emissions from the Project:

- New Source Performance Standards (NSPS)
- National Emissions Standards for Hazardous Air Pollutants (NESHAP)
- New Source Review (including PSD and Non-attainment New Source Review [NNSR])
- Title V Operating Permits (Title V)
- Compliance Assurance Monitoring (CAM)
- General Conformity
- Florida Air Quality Regulations.

USEPA Region 4 will evaluate the Project's expected air emissions estimated in the CAA permit application submitted to USEPA by the Applicant, and develop a CAA preconstruction permit identifying all applicable requirements. The draft permit will be available for public review and comment prior to issuance of the final permit. The Project would conform to the Florida State Implementation Plan (SIP).

NSPS. Four NSPSs potentially apply to emissions sources associated with the Project. The Project has equipment that could be subject to the NSPS Standards for Fossil-Fuel-Fired Steam Generating Units (40 CFR 60, Subpart D) and the Standards for Large Industrial-Commercial-Institutional (ICI) Steam-Generating Units (40 CFR 60, Subpart Db), NSPS Standard of Performance for Stationary Compression Ignition Internal Combustion Engines (40 CFR 60 Subpart IIII), and NSPS Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (40 CFR 60, Subpart JJJJ).

The SRV vaporization boilers could be subject to the NSPS Standards for Fossil-Fuel-Fired Steam Generating Units (40 CFR 60, Subpart D) and the Standards for Large ICI Steam-Generating Units (40 CFR 60, Subpart Db). According to 40 CFR 60.41b(j), any affected facility meeting the applicability requirements under 40 CFR 60, Subpart Db is not subject to the standards under 40 CFR 60, Subpart D. The NSPS for Large ICI Steam-Generating units apply to new boilers that have a maximum heat input equal to or greater than 107 gigajoules per hour (100 MMBtu/hr) and that commenced construction after 1984 [40 CFR 60.44b(a)]. For boilers firing natural gas, the applicable NSPS emissions standard for NO_X is 0.09 kilograms (kg) NO_X /gigajoule (0.20 lb NO_X/MMBtu). Compliance with the standard is determined on a 30-day rolling average basis, in accordance with 40 CFR 60.44b(a)(1)(ii). Compliance with the NSPS Subpart Db NO_X emissions standard would be determined thorough performance testing. Performance testing would be conducted according to provisions of 40 CFR 60.46b. The installation, maintenance, and operation of a continuous emissions monitoring system (CEMS) for NO_X would also be required. Each boiler would be subject to the NSPS monitoring, recordkeeping, and reporting requirements. The particulate matter emissions standard, applicable to any fossil fuel, is 0.045 kg NO_X/gigajoule (0.10 lb/MMBtu). The particulate matter NSPS includes an emissions standard for opacity of no greater than 20 percent opacity except for one 6-minute period per hour of no greater than 27 percent opacity.

NSPS Standard of Performance for Stationary Compression Ignition Internal Combustion Engines is established under 40 CFR 60 Subpart IIII. Since the dual fuel engines are proposed for each to burn 99 percent natural gas and 1 percent marine diesel as pilot fuel, by definition the engines are considered spark ignition engines (40 CFR 60.4219). As a result, the provisions of NSPS Subpart IIII do not apply to the proposed Project.

NSPS Standards of Performance for Stationary Spark Ignition Internal Combustion Engines have been adopted under 40 CFR 60, Subpart JJJJ. This regulation was adopted by USEPA on January 18, 2008. This regulation is potentially applicable to the dual-fuel engines.

NESHAP. 40 CFR 60, Subparts 61 and 63 regulate emissions of hazardous air pollutants (HAPs) from new and existing sources. The Clean Air Act Amendments (CAAA) of 1990, under revisions to Section 112, requires USEPA to list and promulgate NESHAP to reduce HAP emissions (such as formaldehyde, benzene, xylene, and toluene) from categories of major and area sources. As these standards are promulgated, they are published in 40 CFR 63. The major source threshold for NESHAP is 9 metric tons per year (tpy) (10 tpy) of any single HAP or 23 metric tpy (25 tpy) for all combined HAP emissions.

The Project design and equipment specifications indicate that the Project would not operate any process source type or emissions source type regulated under Part 61. Therefore, the Project is not subject to the NESHAP regulations established under 40 CFR Part 61. The Project design and equipment specifications also indicate that HAP emissions would be less than 4.5 metric tpy (5 tpy) of benzene and less than 14 metric tpy (15 tpy) of total HAPs, which are well below the major source thresholds of 9 metric tpy (10 tpy) of any individual HAP and 23 metric tpy (25 tpy) of total HAPs.

USEPA promulgated NESHAP standards for natural gas transmission and storage (40 CFR 63 Subpart H) and oil and natural gas production (40 CFR 63 Subpart H) in 1999. In 2004, USEPA promulgated NESHAP standards for ICI boilers and process heaters (40 CFR 63 Subpart D), and standards for internal combustion reciprocating engines (40 CFR 63, Subpart Z). The Project design and equipment specifications indicate that HAP emissions from the Project would be less than the major source thresholds of 9 metric tpy (10 tpy) of any individual HAP and 23 metric tpy (25 tpy) of total HAPs.

New Source Review. Proposed new or modified air pollutant emissions sources must undergo a New Source Review (NSR) permitting process prior to construction or operation. Through the NSR permitting process, Federal regulatory agencies use local and state laws as the standard to review and approve Project construction plans, regulate pollutant increases or changes, emissions controls, and various other details. While Florida has a USEPA-approved SIP, this Project is under Federal jurisdiction with respect to air quality permitting. However, the DWPA directs the USEPA to apply the laws of Florida when permitting the source. The state NSR program must be at least as stringent as the Federal NSR program. The agencies then issue construction permits that include specific requirements for emissions control equipment and operating limits. Once construction is complete, the sources are issued operating permits that specify detailed operating conditions, emissions limits, fees, reporting and recordkeeping requirements, and various other operating parameters that must be met throughout the life of the permit. The three basic categories of NSR permitting are PSD, NNSR, and Minor NSR. The applicability of each NSR permitting process depends on the attainment status of the Project location, and whether the Project sources exceed specific emissions thresholds established in local, state, and Federal regulations. The basic elements of PSD and NNSR are described below.

PSD. Regulations for PSD are intended to preserve the existing air quality in attainment areas where pollutant levels are below (or better than) the NAAQS. New major sources of air emissions in attainment areas are subject to regulations in order to prevent the significant deterioration of air quality. The Tampa Bay area has PSD regulations in place in accordance with 40 CFR 52.21, and the Applicant would be required to obtain a PSD air quality permit. In addition to requiring an extensive review of environmental impacts, visible emissions, control technologies, and related impacts, PSD regulations impose specific limits on the amount of pollutants that major new or modified stationary sources might contribute to existing air quality levels. Ambient air quality impact analysis demonstrating compliance with ambient air quality standards and PSD increments is required. PSD major sources of attainment pollutants (SO_2, NO_2, PM, CO, and Pb) are subject to Federal PSD requirements (40 CFR 52.21).

For 28 specific source categories, the PSD major source threshold is 91 metric tpy (100 tpy). Because fossil fuel boilers with a heat input capacity greater than 250 MMBtu/hr are one of the 28 listed source categories, the Project is subject to the 100-tpy emissions threshold. Emissions estimates for the large-capacity boilers operated within the exclusion zone indicate that the Project exceeds PSD major source threshold of 100 tpy and is therefore subject to PSD review.

Under the PSD program, Class I areas are assigned to protect Federal wilderness areas such as national parks, where the least amount of air quality deterioration is allowed. Class I areas are designated as pristine natural areas or areas of natural significance. The Class II designation is used for all other areas, except heavily industrialized zones which are Class III designations (40 CFR 51.166). Each classification differs in terms of the amount of growth allowed before significant deterioration of air quality occurs. The Project is subject to PSD permit requirements, and Class I or II increment analysis could be required if project modeled impacts are above the Class I or II Significant Impact Levels (SILs).

NNSR. New major sources in nonattainment areas are subject to NNSR regulations in accordance with 40 CFR 52.24. NNSR is not applicable to the Project, since none of the areas adjacent to the Project are designated nonattainment for any pollutant. In March 2009, FDEP requested that most of the Tampa Bay area be designated as nonattainment for ozone, so it is possible that the area could be designated as non-attainment for the 2008 ozone standard before the Project is implemented. If this should occur, then NNSR requirements would become applicable.

Title V. CAA Title V operating permits are vehicles for ensuring that existing air quality control requirements are appropriately applied to facility emissions units in a single document, thereby enhancing compliance with the requirements of the CAA. The Title V operating permit program does not generally impose new substantive air quality control requirements, but does require permits to contain monitoring, recordkeeping, reporting, and other requirements to ensure compliance by sources with existing applicable requirements, 40 CFR §70.1(b). The Title V program applies, at a minimum, to any source defined as "major" under the CAA, any source subject to an NSPS or NESHAP (unless the source is part of a category USEPA has exempted), any "affected" source under Title IV of the CAA, any source required to have a PSD or NNSR permit, and any source in any category designated by USEPA.

While Florida has an approved Title V program, the proposed offshore facility is located beyond state jurisdiction with respect to air quality permitting, while the onshore portion of the proposed Project is below the emissions threshold at which a Title V permit is required. The Applicant must submit an operating permit application to the USEPA, which will review and issue any required air quality operating permits.

The public can view the PSD, NSR, and Title V permit applications online at the following Web site: http://www.epa.gov/Region4/air/permits/.

Compliance Assurance Monitoring. CAM requirements apply to stationary sources that (1) are equipped with post-process pollutant control devices, (2) have pre-control device emissions equal to or greater than 100 percent of the major source threshold for a pollutant, and (3) are subject to the Title V permit program. In accordance with regulations promulgated in 40 CFR Part 64, a CAM plan must be developed, as part of the Title V Operating Permit application, for each affected pollutant emitted from each affected source. The focus of the CAM Plan will be to ensure and document proper operation of the control device, thereby ensuring compliance with the applicable emissions limit.

General Conformity Determination. Section 176(c)(1) of the CAA mandates the general conformity rule[11]. This legislation prohibits the Federal government from conducting, supporting, or approving any actions that do not conform to an USEPA-approved SIP, a state's self-prepared plan for achieving and maintaining compliance with the goals of the CAA and the NAAQS. A SIP is a compilation of a state's air quality control plans/rules, approved by USEPA.

The 1990 CAAA revised Section 176(c) to expand and clarify Congressional intent for the conformity rule, and added a mandate for USEPA to establish a Federal conformity program[12]. The general conformity rule covers all Federal actions not addressed by the Transportation Conformity rule. USEPA promulgated the general conformity rule on November 30, 1993[13]; the rule and all subsequent amendments are found at 40 CFR 93 Subpart B. Federal agencies are required to demonstrate that their actions "conform" to the approved SIP for the geographic area in question, by performing a conformity review. The conformity review is the process used to evaluate and document project-related air pollutant emissions, local air quality impacts, and the potential need for emissions mitigation.

The General Conformity Rule applies only to Federal actions in locations designated as nonattainment or maintenance areas for any criteria pollutant under 40 CFR Part 81, "Designation of Areas for Air Quality Planning Purposes." The Project is adjacent to Manatee, Hillsborough and Pinellas counties. Hillsborough and Pinellas counties are 1-hour ozone maintenance areas. In March 2009, FDEP requested that most of the Tampa Bay area be designated as nonattainment for ozone, so it is possible that the area could be designated as nonattainment for the 2008 ozone standard before the Project is implemented. If this should occur, then general conformity requirements would become applicable.

Based on information provided from the Applicant in completing the general conformity determination for this Project, it was noted that the D.C. Circuit Court of Appeals recently vacated certain aspects of USEPA's phase I rule implementing the 8-hour ozone NAAQS (South Coast Air Quality Management District vs. USEPA, 472 F. 3d 882 [D.C. Cir. 2006]). USEPA is seeking a rehearing from the court on several aspects of the decision including conformity. The final position adopted by the Court might have implications for actions taken with respect to conformity programs in areas that were nonattainment or maintenance areas for the 1-hour standard. This decision is relevant to the Project in that both Hillsborough and Pinellas counties are maintenance areas for the 1-hour standard at this time. Therefore, the Project is not subject to general conformity at this time, pending a final decision by the Court.

Florida Air Quality Regulations. Although the Port would be outside the jurisdictional boundary for Florida, under the DWPA the facility would be subject to Florida regulations pertaining to individual pollutants and sources. Florida air quality and permitting requirements are codified in Title 62. These regulations include the following:

- FAAQS
- Permit Approval Requirements
- NNSR
- Operating Permit Program
- Florida Permitting Exemptions
- Emissions Limitations
- Visible Emissions Limitations.

[11] 42 U.S.C. 7506(c), Activities not conforming to approved or promulgated plans.
[12] PL 101-549, CAAA-90, Title I, Section 101(f), Conformity Requirements.
[13] 58 FR 63214, Final Rule, Determining Conformity of General Federal Actions to State or Federal Implementation Plans.

The Florida regulations incorporate the Federal program requirements listed in 40 CFR Parts 50–99, and establish plan approval procedures for all facilities that can emit pollutants to the ambient air. All new facilities are required to obtain plan approval prior to initiating construction. Facilities can trigger additional review if emissions exceed the major source thresholds listed in 40 CFR §52.21(b)(1)(i), or Title 62 Chapter 4 Permits.

Florida Ambient Air Quality Standards. The FAAQS are identical to the NAAQS per 40 CFR Part 50, except for the more stringent SO_2 requirement.

Florida New Source Review. Pursuant to the DWPA, USEPA is the permitting authority for deepwater ports. Therefore, USEPA is the permitting authority for all applicable state requirements. Florida NSR applies to new emissions sources that would be located in designated attainment areas and would emit a regulated pollutant. Four counties are in the vicinity of the Port Dolphin project, Pinellas, Hillsborough, Manatee, and Sarasota, and are in attainment for all criteria pollutants (i.e., NO_X, CO, SO_2, O_3, PM, and Pb). Since emissions of NO_X and VOCs are precursors to ozone, major sources of NO_X or VOC emissions are also considered major for ozone. New major sources located in a maintenance area are subject to Florida NSR. Therefore, a new major source in Hillsborough County is subject to Florida NSR.

Florida Operating Permit Program. The Federal Title V program (40 CFR 70) requires major sources of air emissions to obtain Federal operating permits. While Florida has an approved Title V program, this facility is located beyond state jurisdiction with respect to air quality permitting. The Applicant must submit an operating permit application to the USEPA, which will review and issue any required air quality operating permits. Potential emissions from the proposed Project exceed the 100-tpy applicable threshold of any criteria pollutant. Submission of the Title V permit application is not required until the plant becomes operational and within 12 months of that date.

Florida Permitting Exemptions. The Applicant surveyed the onshore facilities for permitting separately. The onshore pipeline facilities would include Port Manatee valve station at the landing point, the Gulfstream interconnection station, and the TECO interconnection station. The onshore facilities associated with the deepwater port operations are subject to the FDEP air quality rules and regulations. The aggregated potential emissions from these facilities are lower than the Title V major source thresholds. In addition, each of the three onshore facilities has a potential to emit less than 10 tpy. These facilities are therefore exempt from obtaining an air permit pursuant to Florida Chapter 62.210.300 (3).

Stationary Source Emissions Standards Florida Pollutant Emissions Limiting Standards. This regulation identified in Florida Chapter 62.296.320 contains general pollutant emissions limiting standards, including particulate standards, opacity limits, and visible emissions. The Project is subject to the applicable stationary source emissions standards.

Stationary Source Emissions Standards Florida NO_X Reasonable Available Control Technology (RACT). The nearest counties to the Project that are 1-hour ozone maintenance are Hillsborough and Pinellas counties. Since NO_X is a precursor to ozone and the facility is a major source of NO_X, the facility is subject to the applicable NO_X RACT requirements identified in Florida Chapters 62.296.500 and 62.296.570.

Stationary Source Emissions Standards Florida Petroleum Liquid Storage. The Project is subject to the applicable stationary source emissions standards for petroleum liquid storage identified in Florida Chapter 62.296.508.

3.7.4 Regional Climatology

This section describes the climate and meteorological conditions for the west-central coast of Florida near Tampa/St. Petersburg. The Florida climate is affected by the ocean, its close proximity to the equator, and its low elevation. The Tampa/St. Petersburg area climate is dominated by the waters of the GOM to the west, Tampa Bay, and the Atlantic Ocean across Florida to the east. The southern areas of Florida have a more tropical climate, being closer to the equator, while central and northern Florida is subtropical. Tampa lies near the west-central Florida coast, situated between northern and southern Florida regimes, so it experiences a mix of weather conditions.

Summers along the west-central Florida coast are hot and humid, with July and August being the warmest months. Florida's high humidity in the summer makes temperatures seem hotter than the average 90 °F (32.2 °C), but temperatures as high as 100 °F (37.8 °C) rarely occur. Moist, unstable air frequently flows through the region, particularly in the summer months, and summer thunderstorms are frequent. Summer is the rainy season in Florida with a good chance of afternoon thunderstorms at least every other day. The GOM provides a continuous source of moisture and influences temperatures in the region. Rainfall is heaviest July through September, with occasional heavy rains accompanying tropical disturbances. Peak hurricane season in Florida is in the mid to late summer months.

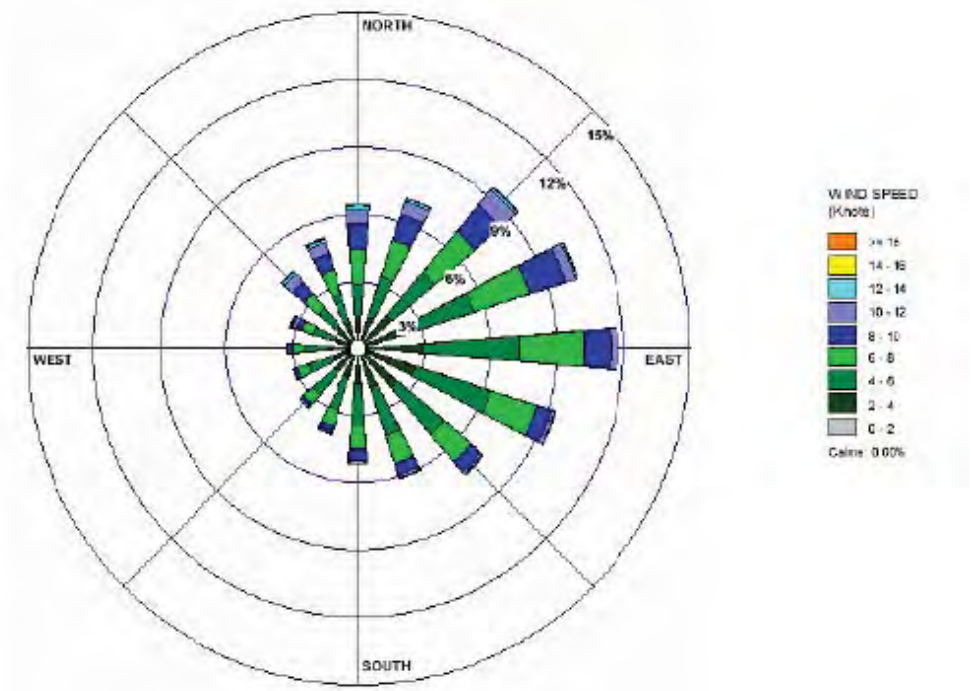
Florida's wet or rainy season extends from May through October. In central and northern Florida, humidity and temperatures decrease toward the end of October. Winter and spring are Florida's dry season from around November through March and April. A mix of cold and warm days occurs during the winter months, with several days of freezing temperatures occurring each year. April and November are the driest months of the year. In general, offshore climate and weather conditions are similar to onshore conditions, except that there is less daily temperature variation offshore.

Wind speed and direction near the Port Dolphin project location are variable depending on geographic location. **Table 3.7-2** presents monthly average wind speed (in knots) at Tampa International Airport based on a 59-year record. Offshore, in the vicinity of Port Dolphin, winds from the east dominate. **Figure 3.7-2** is a wind rose diagram depicting predominate wind patterns based on 13 years of wave measurements from offshore Coastal Ocean Monitoring and Prediction System (COMPS) C10 buoy, located at 27.375°N, 83.125°W. Wind speed and direction were inferred from wave measurements (APL 2006). By contrast, **Figure 3.7-3** illustrates the wind frequency at Sarasota-Bradenton International Airport, on the Gulf Coast about 14 miles south of Port Manatee. This onshore meteorological station shows a maximum wind occurrence from the east, but has a secondary wind direction maximum from the west.

Table 3.7-2. Tampa International Airport Monthly Average Wind Speed (knots)

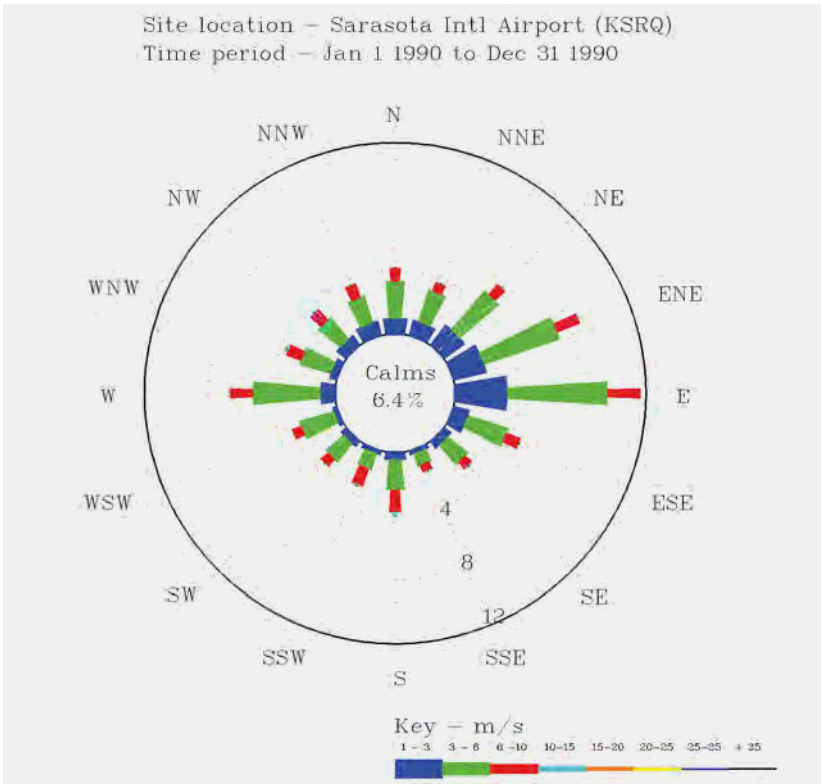
	Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Tampa, Florida	59	8.6	9.1	9.4	9.2	8.6	7.9	7.1	6.9	7.6	8.3	8.2	8.3	8.3

Monthly average air temperatures and extremes are listed for the Tampa Bay area from the Tampa International Airport weather station for the years 1900 to 2005 (see **Table 3.7-3**). Averages indicate that July and August are the warmest months, and December and January the coolest. To compare land air temperatures with offshore air temperatures, data were plotted from the COMPS C10 buoy located at 27°58N, 82°32W in a water depth of 25 m (82 feet) (see **Figure 3.7-4**). This buoy is a few miles



Source: APL 2006

Figure 3.7-2. Wind Rose Derived from 13 Years of Data at 27.375°N, 83.125°W



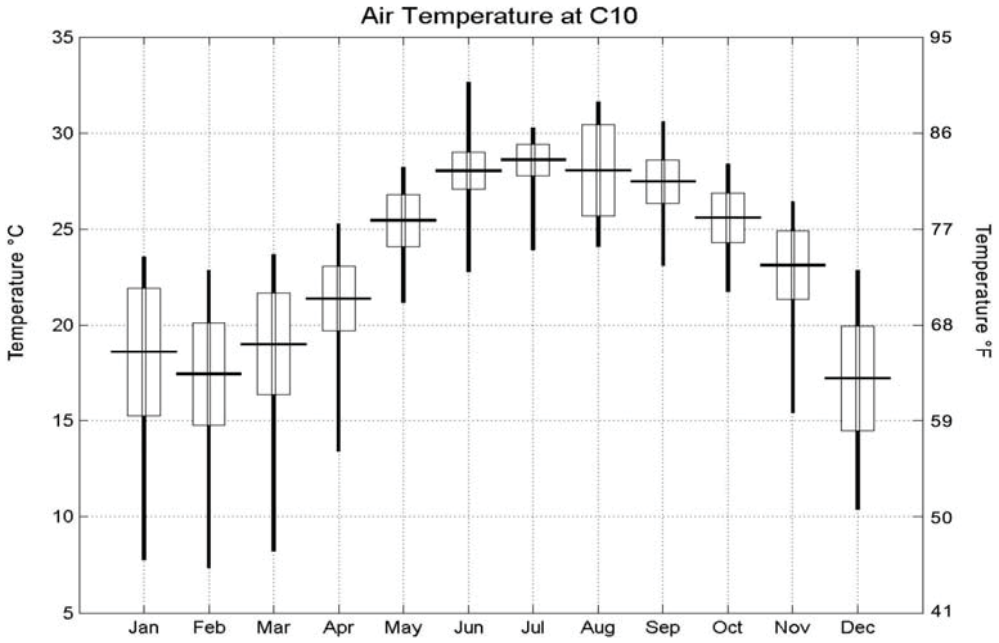
Source: EarthTech 2007

Figure 3.7-3. Wind Rose at Sarasota Airport (1990)

Table 3.7-3. Summary of Average and Extreme Air Temperature From Tampa International Airport at 27°58N, 82°32W

Units	Monthly Averages			Daily Extremes
	Max.	Min.	Mean	High
	°F	°F	°F	°F
January	70.5	50.9	60.7	86
February	72.1	52.5	62.3	88
March	76.5	57.1	66.8	91
April	81.6	61.8	71.7	93
May	87.2	68.0	77.6	98
June	89.6	73.0	81.3	99
July	90.1	74.5	82.3	98
August	90.3	74.6	82.5	98
September	88.9	73.2	81.0	96
October	84.0	66.2	75.1	95
November	77.4	58.1	67.8	90
December	71.9	52.3	62.1	86
Annual	81.7	63.5	72.6	99

Source: SERCC 2009
Note: From Year 1900 to Year 2005
Station: (088788) TAMPA WSCMO Tampa, Florida



Source: APL 2006

Note: The horizontal bars show the mean monthly temperature. Box limits indicate plus or minus one standard deviation and the vertical bars are monthly extremes.

Figure 3.7-4. Air Temperature at the COMPS C10 Buoy (27°10.152N, 82°55.552W)

southeast of the Port Dolphin location. Offshore buoy data show that July temperatures are warmest, averaging around 82.4 °F (28 °C) and temperatures are coolest in December, near 62.6 °F (17 °C). Temperatures are most variable during the winter months due to excess cold fronts and also during August because of increased summer storm activity.

3.7.5 Existing Ambient Air Quality

Background air quality data in the area surrounding the Project are available from numerous monitoring stations in the three counties east of the proposed deepwater Port. The measured pollutant concentrations for PM_{10} and $PM_{2.5}$, SO_2, NO_2, CO, and O_3 are presented in **Tables 3.7-4** through **3.7-8**, respectively. These data were acquired from the FDEP Web site (FDEP 2007). Many of the monitoring stations are in urban areas; air quality measurements from those locations might not be representative of concentrations at the Class II areas where receptors for dispersion modeling are located. Estimated worst-case background concentrations are in bold in **Tables 3.7-4** through **3.7-8**.

3.8 Noise

3.8.1 Definition of the Resource

Airborne Noise. The terms noise and sound are often used interchangeably. Physically there is no difference between these concepts, although it is an important distinction for the human listener. Noise is a class of sounds that are considered unwanted and in some situations noise can adversely affect the health and well-being of individuals. Consequently, noise is not typically defined solely on the basis of physical sound parameters. Rather it is defined as audible acoustic energy that adversely affects, or can affect, the physiological and psychological well-being of people (Berglund and Lindvall 1995).

Noise can be generated by natural sources such as wind, rain, and birds and by a wide variety of human sources such as automobiles, farm machinery, and industrial facilities. It is produced by any vibrating body and is transmitted in air as a longitudinal wave motion. The amplitude of the noise varies depending on the changing weather conditions and the surrounding terrain and vegetation.

As presented in **Figure 3.8-1**, sound travels in waves and the basic components of sound waves are frequency, wavelength, velocity, and amplitude. Frequency is the number of pressure waves that pass by a reference point per unit of time and is measured in Hz or cycles per second. Wavelength is the distance between two peaks of a sound wave. The wavelength of a sound equals the speed of sound (velocity) divided by the frequency of the wave. Lower frequency sounds have longer wavelengths than higher frequency sounds. Amplitude (see **Figure 3.8-1**) is the height of the sound pressure wave or the "loudness" of a sound and is typically measured using the decibel (dB) scale (NOAA 2003). A dB is the ratio between a measured pressure (with sound) and a reference pressure (sound at a constant pressure, established by scientific standards). It is a logarithmic unit that accounts for large variations in amplitude; therefore, relatively small changes in dB ratings correspond to large changes in sound pressure.

The ambient sound level of a region is defined by the total noise generated, including sounds from both natural and artificial sources. The magnitudes and frequencies of ambient sound experienced by an individual can vary considerably over the course of the day and throughout the week, due in part to changing weather conditions and the acoustical environment surrounding the individual. The term "A-weighted," is often used to describe the sound levels encountered. It denotes the adjustment of the frequency and amplitude content of an ambient noise event to reflect the way in which the average human ear responds to that event.

Table 3.7-4. Measured PM_{10} and $PM_{2.5}$ Ambient Air Quality

PM_{10} ($\mu g/m^3$)								
Location	County	Site ID	Averaging Time					
			24-hour			Annual		
			2004	2005	2006	2004	2005	2006
Ruskin	Hillsborough	12-057-0066	43	63	67	24.8	27.5	**32.9**
Tampa	Hillsborough	12-057-0083	61	78	65	26.9	26.6	27.2
Tampa	Hillsborough	12-057-0085	30	34	37	19.1	18.5	21.7
Tampa	Hillsborough	12-057-0095	63	39	80	26.7	26.5	28.5
Tampa	Hillsborough	12-057-1002	38	60	47	24.7	26.0	28.7
Tampa	Hillsborough	12-057-1035	54	65	73	24.5	24.4	25.5
Tampa	Hillsborough	12-057-1069	42	36	50	22.2	22.1	27.9
Tampa	Hillsborough	12-057-1070	62	71	96	27.6	29.1	32.3
Brandon	Hillsborough	12-057-2002	40	36	40	20.3	19.6	23.0
not in a city	Manatee	12-081-0008	37	**99**	49	22.1	27.2	24.3
St Petersburg	Pinellas	12-103-0012	80	54	43	29.4	23.3	24.4
St Petersburg	Pinellas	12-103-0018	30	27	36	18.5	16.2	18.4
Largo	Pinellas	12-103-3004	33	40	35	21.5	21.2	22.3
Tarpon Springs	Pinellas	12-103-5002	25	25	35	16.3	15.5	18.3

$PM_{2.5}$ ($\mu g/m^3$)						
Location	County	Site ID	24-hour Average (2nd highest)			
			2004	2005	2006	3-year average (2nd highest)
Tampa	Hillsborough	12-057-0030	25.8	26.2	19.7	23.9
Tampa	Hillsborough	12-057-0030	27.3	29.5	21.9	26.2
Tampa	Hillsborough	12-057-1065	27.9	25.7	22.3	25.3
Plant City	Hillsborough	12-057-3002	22.9	25.8	19.2	22.6
Plant City	Hillsborough	12-057-3002	39.7	30.6	22.3	**30.9**
Plant City	Hillsborough	12-057-4004	22.8	30.4	22.1	25.1
Bradenton	Manatee	12-081-4012	20.6	20.6	19.6	20.3
St Petersburg	Pinellas	12-103-0018	19.9	24.9	20.6	21.8
St Petersburg	Pinellas	12-103-0018	26.2	26.8	23.8	25.6
Clearwater	Pinellas	12-103-1009	21.7	21.2	18.6	20.5
Tampa	Hillsborough	12-057-0030	11.34	11.09	9.94	10.8
Tampa	Hillsborough	12-057-0030	12.66	yyy	11.54	12.1
Tampa	Hillsborough	12-057-1065	11.54	12.19	11.66	11.8
Plant City	Hillsborough	12-057-3002	11.46	10.87	9.95	10.8
Plant City	Hillsborough	12-057-3002	13.33	12.38	11.62	12.4
Plant City	Hillsborough	12-057-4004	12.03	12.45	11.65	12.0
Bradenton	Manatee	12-081-4012	9.11	8.91	8.74	8.9
St Petersburg	Pinellas	12-103-0018	9.64	10.40	9.53	9.9
St Petersburg	Pinellas	12-103-0018	11.74	12.14	11.20	11.7
Clearwater	Pinellas	12-103-1009	10.27	9.48	9.35	9.7

Source: FDEP 2008

Table 3.7-5. Measured SO_2 Ambient Air Quality (ppm)

Location	County	Site ID	Averaging Time								
			3-hour (2nd highest)			24-hour (2nd highest)			Annual		
			2004	2005	2006	2004	2005	2006	2004	2005	2006
Tampa	Hillsborough	12-057-0053	0.038	0.037	0.031	0.008	0.007	0.008	0.0026	0.0025	0.0021
Tampa	Hillsborough	12-057-0081	0.029	0.032	0.035	0.010	0.008	0.011	0.0028	0.0023	0.0022
Tampa	Hillsborough	12-057-0095	0.017	0.065	0.019	0.004	0.012	0.005	0.0016	0.0017	0.0014
Tampa	Hillsborough	12-057-0109	0.092	0.097	0.077	0.029	0.033	**0.038**	0.0034	0.0031	0.0032
Tampa	Hillsborough	12-057-1035	0.059	0.055	0.093	0.016	0.015	0.025	0.0042	0.0039	0.0043
Plant City	Hillsborough	12-057-4004	0.023	0.013	0.015	0.005	0.005	0.006	0.0016	0.0017	0.0017
Palmetto	Manatee	12-081-3002	0.023	0.017	0.017	0.008	0.007	0.005	0.0017	0.0017	0.0015
St Petersburg	Pinellas	12-103-0023	**0.102**	0.059	0.070	0.033	0.024	0.019	**0.0045**	0.0031	0.0027
Pinellas Park	Pinellas	12-103-3002	0.034	0.038	0.038	0.010	0.013	0.008	0.0019	0.0020	0.0015
Tarpon Springs	Pinellas	12-103-5002	0.043	0.048	0.050	0.012	0.009	0.011	0.0019	0.0018	0.0017
Tarpon Springs	Pinellas	12-103-5003	0.051	0.054	0.063	0.013	0.011	0.012	0.0020	0.0019	0.0020

Source: FDEP 2008

Table 3.7-6. Measured NO_2 Ambient Air Quality (ppm)

Location	County	Site ID	Averaging Time		
			Annual		
			2004	2005	2006
Tampa	Hillsborough	12-057-0081	0.006	0.006	0.005
Tampa	Hillsborough	12-057-1065	0.009	0.008	0.007
Plant City	Hillsborough	12-057-3002	0.007	0.007	0.007
Bradenton	Manatee	12-081-4012	0.003	0.005	0.004
St Petersburg	Pinellas	12-103-0018	**0.009**	0.008	0.008

Source: FDEP 2008

Table 3.7-7. Measured CO Ambient Air Quality (ppm)

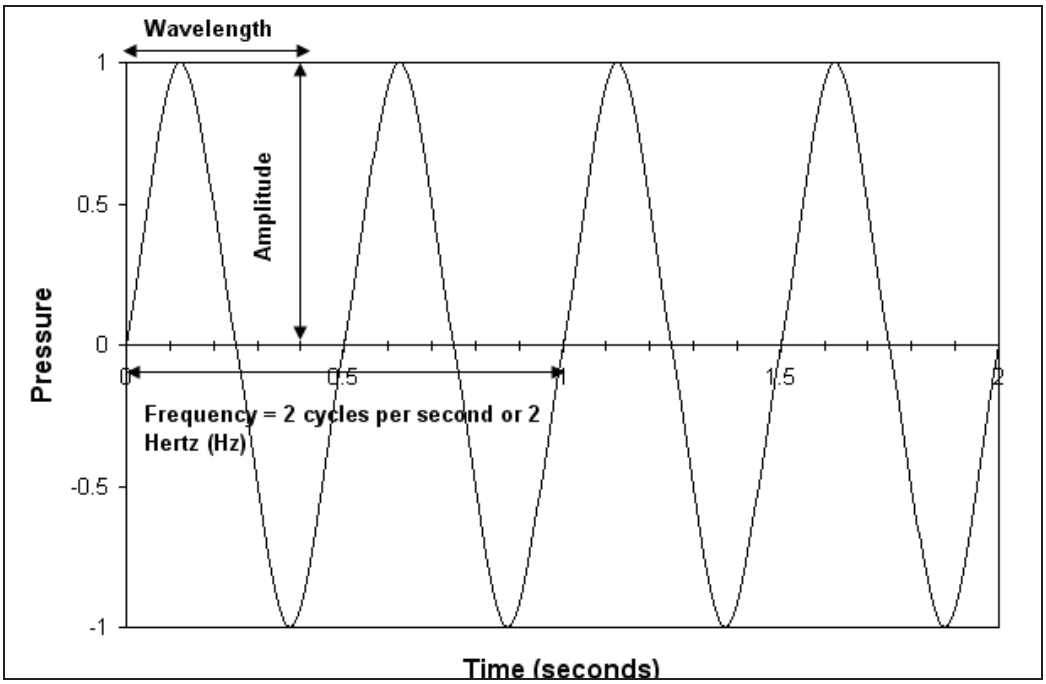
Location	County	Site ID	Averaging Time					
			1-hour (2nd highest)			8-hour (2nd highest)		
			2004	2005	2006	2004	2005	2006
Tampa	Hillsborough	12-057-1070	**4.4**	4.0	4.0	2.5	**3.0**	2.9
Plant City	Hillsborough	12-057-4004	1.8	1.9	2.6	1.3	1.5	1.9
St Petersburg	Pinellas	12-103-0018	2.4	2.3	2.2	1.2	1.3	1.4
St Petersburg	Pinellas	12-103-0024	2.8	2.2	2.3	1.7	1.6	1.7
Clearwater	Pinellas	12-103-2006	2.4	2.5	1.9	1.2	1.3	1.1
Clearwater	Pinellas	12-103-2008	2.6	2.5	2.3	1.6	1.5	1.2

Source: FDEP 2008

Table 3.7-8. Measured O_3 Ambient Air Quality (ppm)

Location	County	Site ID	Averaging Time			
			8-hour (4th highest)			
			2004	2005	2006	3-year average
Tampa	Hillsborough	12-057-0081	0.083	0.080	0.082	0.082
not in a city	Hillsborough	12-057-0110	0.073	0.079	0.083	0.078
Tampa	Hillsborough	12-057-1035	0.075	0.077	0.086	0.079
Tampa	Hillsborough	12-057-1065	0.083	0.089	0.090	**0.087**
Plant City	Hillsborough	12-057-3002	0.080	0.079	0.083	0.080
Plant City	Hillsborough	12-057-4004	0.071	0.080	0.085	0.079
Palmetto	Manatee	12-081-3002	0.088	0.082	0.080	0.083
Bradenton	Manatee	12-081-4012	0.082	0.082	0.084	0.083
Bradenton	Manatee	12-081-4013	0.079	0.078	0.078	0.078
Clearwater	Pinellas	12-103-0004	0.077	0.074	0.083	0.078
St Petersburg	Pinellas	12-103-0018	0.077	0.071	0.073	0.074
Tarpon Springs	Pinellas	12-103-5002	0.072	0.076	0.084	0.077

Source: FDEP 2008



Source: NOAA 2003

Figure 3.8-1. The Basic Components of a Sound Wave

Underwater Noise. This section explains the sound level standards and describes the existing ambient sound levels in the area of the Project and the methodology used to discuss a change in sound levels. When underwater objects vibrate or activity occurs, sound-pressure waves are created. These waves alternately compress and decompress the water as the sound wave travels. Underwater sound waves radiate in all directions away from the source (similar to ripples on the surface of a pond). The compressions and decompressions associated with sound waves are detected as changes in pressure by aquatic life (including human ears) and man-made sound receptors such as hydrophones (NOAA 2003).

Sound Pressure Level (SPL) is the sound force per unit area, and is measured in micro Pascals (µPa), where 1 Pa is the pressure resulting from a force of one Newton (a unit of force) exerted over an area of 1 m^2. The intensity of sound is related to the square of the pressure divided by a term called the acoustic impedance. The acoustic impedance is equal to the product of the sound speed and the density of the medium (sea water for this circumstance) (NOAA 2003).

As stated above, the pressure of a sound wave is expressed in dB (a dB is the ratio between a measured pressure [of sound] and a reference pressure [a constant pressure established by the scientific standards community]). In water, the standard reference of SPL is 1 µPa; while in air, a standard sound reference pressure of 20 µPa is used. The source level represents the sound level at a distance of 1 m from the source, referenced to 1 µPa (re 1 µPa at 1 m). The received level is the sound level at the listener's position.

The underwater acoustic environment consists of ambient sounds, defined as environmental background sound levels lacking a single source or point (Richardson et al. 1995). As with airborne noise, the ambient underwater sound level of a region is defined by the total acoustical energy being generated by known and unknown sources, including sounds from both natural and man-made sources. The magnitudes and frequencies of environmental sound levels can vary considerably over the course of the

day and throughout the week, due in part to changing local activity in the Bay and nearby ocean and variation of the local weather conditions.

3.8.2 Regulatory Requirements

There are no local or Federal noise control regulations with specific dB limits that apply to the Project. There are also no local or Federal noise regulations established for underwater acoustical activities associated with the Project. Several state and Federal regulations or guidance have been developed for protecting public health and safety by establishing certain acceptable ambient noise thresholds. These thresholds can be used to evaluate potential noise effects from the Project.

There are no State of Florida regulations pertaining to construction noise. The Manatee County Code of Ordinances does not have any regulations specifically relating to construction noise. However, Manatee County describes the definition of noise pollution in Section 2-21-31 of the municipal code as "the presence of noise in excessive or unnecessary amount or of such duration, wave frequency or intensity as to be injurious to human or animal life or property, or which unreasonably interferes with the comfortable enjoyment or normal activities of life or property, or other conduct of business" (Manatee County 2007). Noise from the operation of construction equipment is allowed during the hours of 7:00 a.m. to 9:00 p.m.

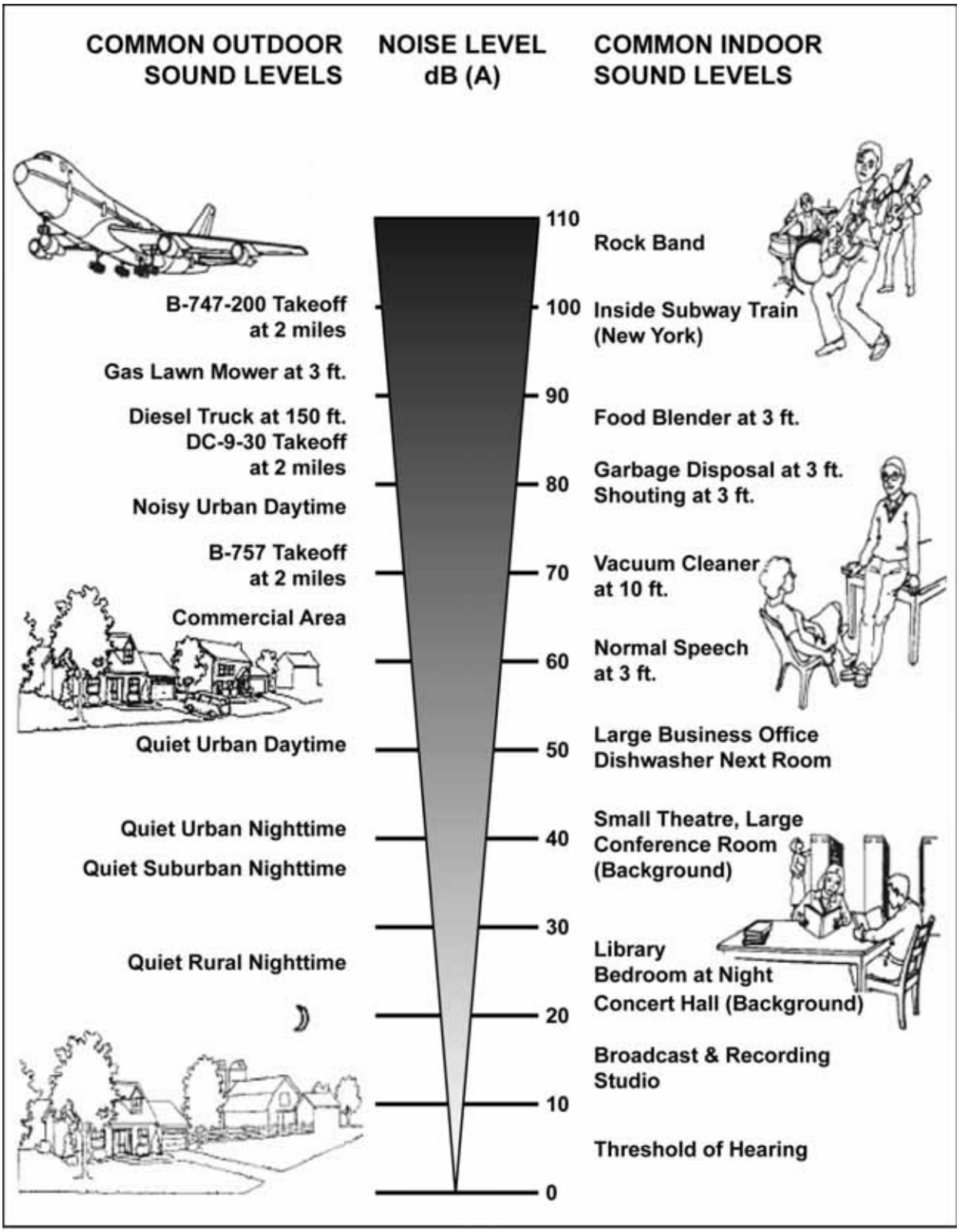
Much of the concerns and research about noise impacts on marine mammals has resulted from the MMPA of 1972. Although there are no specific noise limits that have been officially established from the MMPA, NMFS has developed guidance criteria for assessing acoustic impacts on marine mammals. These criteria are discussed in **Section 3.2.6.**

3.8.3 Existing Ambient Noise Conditions

Anticipated existing ambient noise conditions near the Project Site consist of airborne noise and underwater noise.

Airborne Noise. Current airborne noise levels in the vicinity of Port Manatee are expected to be similar to an urban environment. The ambient sound level increases in Port Manatee when vessel traffic is utilizing the port. Additional industrial facilities are east of Port Manatee. Areas to the north and south of Port Manatee consist of open space and ambient noise levels in these areas would be lower than the levels at the port. Land to the southeast of Port Manatee and on Buckeye Road likely have ambient noise levels equivalent to that of a rural area (see **Figure 3.8-2** for a comparison of relative noise levels).

Underwater Noise. Existing underwater ambient sound levels result from a combination of natural and anthropogenic (man-made) sources. The largest and interrelated natural source of sound is wind and wave action. Wind generated wave action and the resultant sound levels occur over a broad range of frequencies and the sound levels are related to the wind speed and consequent sea conditions (Richardson et al. 1995). Other natural sources of sound that could occur in the study area include sounds caused by precipitation (e.g., raindrops impacting the water surface) and sounds created by marine organisms such as fish, marine mammals, and shrimp. Phillips et al. (2006) presented measurements from manatee habitats in boating channels and rivers along the Florida coast, consisting of fairly flat or slightly sloping seafloors shallower than 5 m (16.4 feet). Ambient noise measurements in these habitats ranged from 69 dB in Crystal River (away from the mouth of the river) to 105 dB near the mouths of the Crystal and Indian rivers.



Source: Landrum and Brown 2002

Figure 3.8-2. Common Noise Sources

The largest and most important source of anthropogenic sound is shipping. In enclosed bays, the primary persistent noise sources tend to be commercial shipping and wind wave action (NRC 2003). Other anthropogenic sound sources in the study areas include recreational boating, dredging, shoreline construction (e.g., bulkheads, revetments, docks, and pile-driving), urban and industrial development, aircraft, and SONARs. Sound levels from some of these activities are generated in air, but can be coupled to the sea by transmission through building foundations, or in the case of aircraft, by transmission through the air-sea interface and might be stationary or transient. The intensity and frequency of the sound level emissions are highly variable, both between and among industry sources. In general, the frequencies of anthropogenic sounds are below 1 kHz and if higher frequency sound levels are created, they will attenuate (decrease) rapidly (Richardson et al. 1995).

Shipping is a major contribution to underwater SPLs, and its impact is strongest in frequencies from 0.005 to 0.5 kHz (NRC 2003). SPLs for various types of ships are presented in **Table 3.8-1**. The sound levels emitted from recreational boating are not quantified. Commercially available fish finders and depth sounders used during recreational boating activities have frequencies within the range of 50 to 200 kHz and SPLs in the range of 201 dB (NRC 2003). Fish finders have a short pulse-width (length in time of the signal) are and are typically designed to focus sound in a downward direction. Aircraft generate below-water sounds with frequencies generally below 0.5 kHz (MMS 2002a). Aircraft sounds are transient.

Table 3.8-1. Underwater Sound Pressure Levels for Various Vessels

Vessel Length and Description	Frequency (Hz)	Source Level (dB re 1μPa at 1 m)
Outboard drive – 23 feet (2 engines, 80 horsepower each)	630	156
Twin Diesel – 112 feet	630	159
Small Supply Ships – 180 to 279 feet	1,000	125–135 (at 50 m)
Freighter – 443 feet	41	172

Source: Richardson et al. 1995

There are no specific data on ambient underwater sound levels for the area of the proposed Port and pipeline route. As stated above, the most important sources of sound are wind waves action and shipping. Ambient underwater sound levels cover the frequency range from 0.001 kHz to 100 kHz with higher decibel levels at the lower frequencies. However, intensity level depends on factors such as wind speed and distance from the sources (e.g., shipping).

Because Tampa Bay is a busy port area, it is assumed that existing ambient underwater sound levels would be dependent upon the levels of shipping and boating. Other sources of man-made sound in the study areas include maintenance dredging and construction and maintenance of port infrastructures.

3.9 Socioeconomic Resources and Environmental Justice

3.9.1 Definition of the Resource

NEPA requires an analysis of socioeconomic issues if socioeconomic effects are interrelated with environmental effects. Socioeconomics are defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Socioeconomic data at local, county, and state levels permit characterization of baseline conditions in the context of regional and state trends.

Two fundamental socioeconomic indicators, population and economic activity, are the major focus of this analysis. Demographics identify the population levels and changes to population levels of a region. Demographics data might also identify, as appropriate to the evaluation of a project, a region's characteristics in terms of race, ethnicity, poverty status, and other broad indicators. Economic activity typically encompasses employment, personal income, and industrial or commercial growth. Data on employment might identify gross numbers of employees, employment by industry or trade, and unemployment trends. Data on personal income in a region can be used to compare the "before" and "after" effects of any jobs created or lost as a result of a project. Data on industrial or commercial growth or growth in other sectors provide baseline and trend line information about the economic health of a region. Socioeconomic data were collected and evaluated for areas near Tampa, Florida, where onshore activities would be performed as part of the Project and where persons employed by the onshore and offshore industries that might be affected by the Project reside. Commercial fishing, marine recreation, and tourism are highlighted in this document as the industries most likely to be affected by the Project.

President Clinton issued EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. This EO requires that Federal agencies' actions substantially affecting human health or the environment do not exclude persons, deny persons benefits, or subject persons to discrimination because of their race, color, or national origin. The provisions of EO 12898 require that no groups of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the adverse environmental consequences resulting from industrial, municipal, and commercial operations; or the execution of Federal, state, tribal, and local programs and policies. Consideration of environmental justice concerns includes race, ethnicity, and the poverty status of populations in the vicinity where a Project would occur.

The demographic data presented in **Section 3.9.2.2** were used to evaluate consistency with the intent of EO 12898. USCG guidance on environmental justice is contained in COMDTINST 5810.3, *Coast Guard Environmental Justice Strategy*. That guidance directs the USCG to "conduct its programs, policies and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under, such programs, policies, and activities, because of their race, color or national origin."

3.9.2 Existing Conditions

Fishery Management. As discussed in **Section 3.2.9**, FMPs are in force for several fisheries and regulate both commercial and recreational fishing. The objectives of the plans vary, but are generally geared towards ensuring the long-term sustainability of the subject fish species and meeting specific management goals. FMPs generally use geographic and seasonal fishery closures, catch limits and quotas, size and age limits, gear restrictions, and access controls to manage the fishery resources.

The GMFMC has developed seven FMPs to promote the long-term health and stability of the managed fisheries. These FMPs are implemented by NMFS and are as follows:

- Shrimp Fishery of the GOM, U.S. waters
- Red Drum Fishery of the GOM
- Reef Fish of the GOM
- Coastal Migratory Pelagic Resources (Mackerels) in the GOM
- Stone Crab Fishery of the GOM and South Atlantic

- Spiny Lobster in the GOM and South Atlantic
- Coral and Coral Reefs of the GOM.

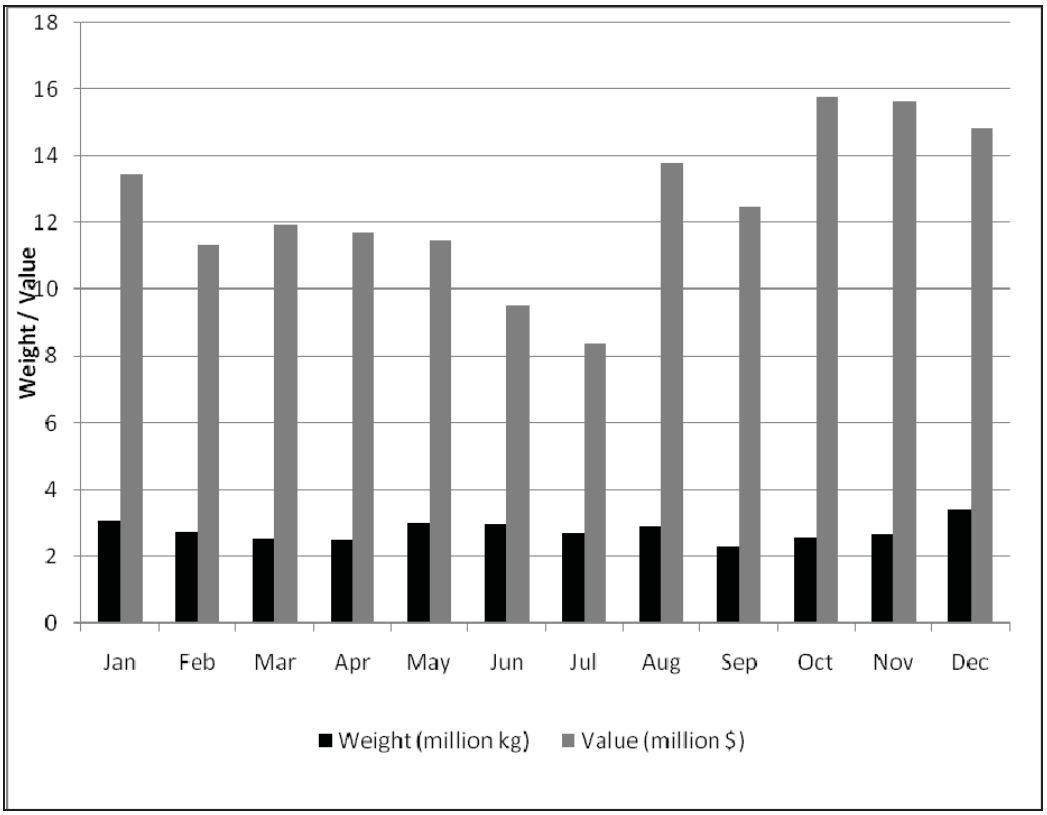
Secretarial FMPs have been developed by NMFS for highly migratory species and include Amendment 1 to the Atlantic Billfish Fishery Management Plan; *Final Fishery Management Plan for Atlantic Tuna, Swordfish, and Sharks;* and the Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan (NMFS 1999a, NMFS 2006a, NMFS 1999b).

Commercial Landings. The 2006 commercial landings for Florida's west coast were approximately 69 million pounds (valued at more than $194 million, a slight decrease from the 70 million pounds (valued at more than $133 million) in 2005 (NMFS 2007a). Landings on the west coast of Florida exceeded 100 million pounds from 1952 to 1994, with the exception of 1954 (landings were approximately 98 million pounds). In 1993, landings dropped to 92 million pounds from almost 117 million pounds in 1994. The peak landing between 1950 and 2006 was in 1989 when landings reached 145 million pounds (valued at almost $158 million in 1989 U.S. dollars). The most valuable catch between 1950 and 2006 was in 1998 when landings were valued at almost $168 million (1998 U.S. dollars) (with a weight of 99 million pounds). On average, landings on the west coast of Florida composed 62 percent of the state's landings in terms of pounds and almost 75 percent in terms of value. Landings from the west coast of Florida accounted for an average 1.87 percent of the nation's landings in terms of pounds and 5.04 percent of the nation's landings in terms of total value from 1950 through 2005. In 2005, Florida's west coast landings accounted for the smallest percentage of the national landings in terms of pounds since 1950 (0.73 percent) and the smallest percentage of value of national landings since 1951 (3.373 percent). The only year that the percentage of the national value was lower was in 1950, when Florida's west coast landings only accounted for 2.97 percent of the value of the national landings (NMFS 2007b).

The five largest catches from 2001 through 2006 on the west coast of Florida were pink shrimp, blue crab, red grouper, striped mullet, and Florida stone crab claws (not necessarily in that order in all 5 years). The five catches with the highest total value from 2001 through 2006 were pink shrimp, Florida stone crab claws, Caribbean spiny lobster, red grouper, and gag (not necessarily in that order). The two most valuable catches in terms of price per pound from 2001 through 2005 were quahog clams and soft and peeler blue crabs (in that order in all years). The value of quahog clams peaked in 2001 at $9.31 per pound (in 2001 U.S. dollars). The third, fourth, and fifth most valuable catches in terms of price per pound varied between pinfish, Caribbean spiny lobster, shellfish (unspecified), slipper lobster, and Florida stone crab (NMFS 2007b).

Figure 3.9-1 presents the 2006 commercial landings in Florida by month. In 2006, approximately 26 percent of the landings, measured by weight, were recorded in the fall (October through December) and approximately 24 percent of the landings were recorded in the summer (July through September), the season with the lowest landings. The value of landings peaked in the winter (January through March), with more than 31 percent of the total annual value for landings. The season with the lowest landings by value was spring (April through June), with approximately 22 percent of the value for landings.

In terms of commercial landings by weight, the striped mullet was the dominant finfish species, composing approximately 8.6 percent of the total landings in Florida in 2006 (NMFS 2007a). The red grouper was the second most dominant finfish species in terms of landings by weight and the dominant species in terms of value, composing approximately 6 percent of the total landings by weight and approximately 7.5 percent by total commercial landing value.



Source: NMFS 2007a

Figure 3.9-1. Commercial Landings by Month, 2006

The pink shrimp was the dominant shellfish species by weight and second most dominant by value, composing almost 13 percent of the total landings by weight, and almost 13.5 percent by value. The blue crab was the second most dominant species of shellfish composing approximately 11.6 percent of the state's commercial landings by weight and the third most dominant by value, composing approximately 12.7 percent by total commercial landing value. The Caribbean spiny lobster was the most valuable overall, composing approximately 14.2 percent of the total commercial landing value while consisting of only approximately 4.8 percent of the total landings.

In 1995, NMFS began collecting and reporting data so that catches made in state waters—usually 0 to 6 km (0 to 3 NM) from shore—could be differentiated from those made in the EEZ and in the high seas, greater than 370 km (200 NM) from shore. While the landings reported are preliminary and still subject to change (NMFS 2006b), they provide an indication of how the catch is distributed between these zones.

As shown by **Table 3.9-1**, the data indicate that, in terms of weight and value, landings from state and Federal waters were relatively level, ranging between 48 and 52 percent (NMFS 2006b).

In terms of landings by weight, finfish dominate the commercial catch, comprising approximately 59 percent of the catch by weight in the EEZ. The relative economic value of landings from the state waters was reversed because shellfish accounted for approximately 86 percent and finfish represented almost 14 percent of the value. In the EEZ, shellfish accounted for approximately 52 percent of the area landings by value and finfish represented almost 48 percent. In state and Federal waters combined, the relative value of finfish to shellfish was more markedly reduced, and shellfish represented almost 70 percent of the value of the landings (NMFS 2006b).

Table 3.9-1. Commercial Landings by Distance from Shore, 2006

	Landings by Weight				Landings by Value		
	Thousands of kilograms	Thousands of Pounds	Percent of Area Landings	Percent of Total Landings	Thousands of Dollars	Percent of Area Landings	Percent of Total Landings
State Waters							
Finfish	9,661	21,299	43.4	22.4	16,968	13.9	7.2
Shellfish	12,574	27,721	56.6	29.1	105,349	86.1	44.4
Subtotal	*22,235*	*49,020*	*100.0*	*51.5*	*122,317*	*100.0*	*51.6*
Exclusive Economic Zone							
Finfish	12,359	27,248	59.0	28.6	54,768	47.7	23.1
Shellfish	8,613	18,989	41.0	19.9	60,045	52.3	25.3
Subtotal	*20,972*	*46,236*	*100.0*	*48.5*	*114,813*	*100.0*	*48.4*
Totals	**43,207**	**95,256**	**-**	**100.0**	**237,130**	**-**	**100.0**

Source: NMFS 2006b

Notes: Numbers might not total exactly due to rounding. No landings from the high seas were reported.

U.S. commercial fisheries landings data are collected by the state and NMFS. The cooperative State-Federal fishery data collection systems obtain landings data from state-mandated fishery or mollusk trip-tickets, landing weighout reports provided by seafood dealers, Federal logbooks of fishery catch and effort, and shipboard and portside interview and biological sampling of catches. State fishery agencies are usually the primary collectors of landings data, but in some states NMFS and state personnel cooperatively collect the data. Survey methodology differs by state, but NMFS makes supplemental surveys to ensure that the data from different states and years are comparable (NMFS 2007b).

Statistics for each state represent a census of the volume and value of finfish and shellfish landed and sold at the dock rather than an expanded estimate of landings based on sampling data. These data do not indicate where the fish were caught. Principal landing statistics that are collected consist of the pounds and ex-vessel dollar value of landings identified by species, year, month, state, county, port, water, and fishing gear (NMFS 2007b).

Table 3.9-2 presents the total commercial landings in Florida from 1996 through 2006. Over the decade ending in 2006, the commercial landings of food and baitfish, measured by weight, averaged about 55 million kg (121 million lb) per year. Commercial landings ranged between more than 65 million kg (145 million lb) in 1996 to a low of almost 42 million kg (93 million lb), 10 years later, in 2005 (NMFS 2007a).

Harvests were moderately stable from 1996 to 2004, with annual landings typically deviating from the average by approximately 15 percent. The landings data show a 26 percent decrease from 2004 to 2005, which is most likely a result of hurricanes Katrina and Rita. The data show an overall decline of approximately 3 percent over the decade. Landings values averaged almost $200 million from 1996 to 2005. There was a 26 percent decrease in the weight of commercial landings from 2004 to 2005 and a 14 percent decrease in the value of those landings.

Table 3.9-2. Commercial Landings in Florida, 1996 to 2006

Year	Weight (million kg)	Weight (million lb)	Value (million $)
1996	65.6	144.6	224.9
1997	58.1	128.2	204.2
1998	59.0	129.9	213.4
1999	54.9	121.0	212.6
2000	54.0	119.2	219.3
2001	54.3	119.6	197.1
2002	52.3	115.4	184.4
2003	51.7	114.1	178.0
2004	57.5	126.8	194.9
2005	42.3	93.4	168.4
2006	45.7	100.5	192.3

Source: NMFS 2007a

The Tampa Bay-St. Petersburg ports are the principal Florida ports where commercial fisheries activities are recorded by NMFS. In 2005, Tampa Bay-St. Petersburg, Florida, was ranked 43rd among the top 100 U.S. commercial fishing ports in terms of dollar value of the landings (NMFS 2007c). In terms of weight of the landings, Tampa Bay-St. Petersburg, Florida, was ranked 53rd (NMFS 2007d). The Tampa Bay-St. Petersburg area was ranked second in the State of Florida behind Key West, which was ranked 21st in terms of dollar value and 48th in terms of weight of landings (NMFS 2007c, 2007d).

Table 3.9-3 presents the total commercial landings from 1996 through 2006 for Tampa Bay-St. Petersburg, Florida. Over the decade ending in 2005, commercial landings, measured by weight, for Tampa Bay-St. Petersburg averaged about 5.4 million kg (11.8 million lb) per year. Commercial landings ranged between a low of about 4.3 million kg (9.4 million lb) in 1997 and a high of 6.5 million kg (14.4 million lb) in 1998. The landings data show a marked overall increase of about 23 percent over the 10 years. Landings by value increase even more rapidly, at a rate of approximately 143 percent. Landings in 2006 increased by 19 percent to 5.4 million kg (11.9 million lb) valued at $27.6 million (NMFS 2007e).

Marine Recreation and Tourism. Recreational activities in Tampa Bay primarily comprise game and sport fishing, charter boat fishing, sport diving, sailing, power cruising, and other recreational boating activities. Recreational fishing and other recreational boats range throughout the Florida coastal waters, depending on season and weather conditions. Travel between the most popular cruising destinations along the Florida coast does not require traversing the Project site. Larger recreational vessels travel considerable distances offshore and, depending on local wave and weather conditions, could traverse the vicinity of the Project site.

Marine recreational fishing in Florida is a substantial industry with a high level of activity. The Marine Recreational Fishery Statistics Survey (MRFSS) conducted by NMFS provides estimates of fishing effort, catch, and participation by recreational anglers in the marine waters of the United States. The following discussion of recreational fishing off of Florida is based on the findings of the MRFSS.

Table 3.9-3. Commercial Fishery Landings at Tampa Bay-St. Petersburg, 1996 to 2006

Year	Weight (million kg)	Weight (million lb)	Value (million $)
1996	5.4	11.8	20.0
1997	4.3	9.4	17.6
1998	6.5	14.4	28.7
1999	5.0	11.1	19.2
2000	5.3	11.7	20.4
2001	5.8	12.7	20.2
2002	5.6	12.4	19.2
2003	5.7	12.5	20.9
2004	5.6	12.3	21.6
2005	4.5	10.0	17.8
2006	5.4	11.9	27.6

Source: NMFS 2007e

During the decade from 1996 through 2006, recreational fishing efforts, measured as the number of fishing trips in state inland marine waters and in state and Federal waters off the coast of Florida, averaged approximately 25 million trips per year (NMFS 2006c). As shown by **Table 3.9-4**, recreational fishing efforts ranged from a low of less than 19.5 million trips in 1999 to a high of more than 29.3 million trips in 2006. The lowest level of recreational fishing participation, measured as the number of anglers, occurred in 1996 (4.2 million anglers); however, participation peaked in 2001 (7 million anglers). Recreational fishing participation averaged almost 6.7 million anglers per year, over the decade. Both effort and participation increased during the decade; effort at an overall rate of about 1.2 percent and participation at an overall rate of about 3.8 percent.

Tables 3.9-5 and **3.9-6** present recreational fishing effort and participation data for 2-month sampling periods during 2006. Recreational fishing efforts and participation were concentrated in the period from May through August. About 41 percent of the annual trips and anglers were recorded during this 4-month period. The number of trips to Federal waters peaked during May and June, when 820,659 trips (approximately 29 percent of the annual trips) were taken (NMFS 2007f).

As shown by **Table 3.9-6**, marine recreational fishing brings a considerable number of tourists to the coast and to the state. NMFS defines coastal anglers as those whose residence is within 40 or 80 km (25 or 50 mi) of the coast (depending on the time of year) and out-of-state anglers are not state residents or are from another country. Although the majority of the anglers that fish in Florida marine waters reside within the state's coastal region, nearly 30 percent of the anglers reside outside the state (NMFS 2007b).

3.9.2.1 Onshore Socioeconomic Conditions

As discussed in **Section 3.9.2**, the Tampa Bay-St. Petersburg ports are the two principal Florida fishing ports. The ports also support active marine recreation and tourism industries. If the Project were to result in changes to commercial and recreational fishing and marine tourism, the cities of Tampa, Port Manatee, and St. Petersburg, and the counties in which they reside, are more likely than other Florida communities

Table 3.9-4. Recreational Fishing Effort and Participation, 1996 to 2006

Year	Effort [a]	Participation [b]
	Trips	Anglers
1996	22,857,729	4,232,118
1997	24,683,393	4,563,792
1998	22,324,388	4,782,453
1999	19,491,018	4,435,918
2000	26,565,518	6,358,283
2001	28,852,722	7,095,998
2002	24,721,667	5,781,262
2003	27,452,758	6,488,857
2004	27,091,380	6,533,905
2005	27,538,053	6,581,999
2006	29,345,260	6,666,808

Sources: a. NMFS 2006c, b. NMFS 2007b

Note: Recorded effort and participation are marine recreational fishing trips and anglers visiting any marine fishing area comprising inland waters, the state territorial sea, and the EEZ.

Table 3.9-5. Recreational Fishing Effort, 2006

	Inland Trips	State Territorial Sea Trips	EEZ Trips	Total Trips
Jan–Feb	2,062,758	1,374,599	249,639	3,686,996
Mar–Apr	2,674,577	1,940,931	536,944	5,152,452
May–Jun	2,468,223	2,778,407	820,659	6,067,289
Jul–Aug	2,739,371	2,499,278	594,195	5,832,844
Sep–Oct	2,371,441	1,628,341	352,285	4,352,067
Nov–Dec	2,246,117	1,706,212	301,282	4,253,611
Total	**14,562,487**	**11,927,768**	**2,855,004**	**29,345,259**

Source: NMFS 2007f

Table 3.9-6. Recreational Fishing Participation, 2006

	Coastal Anglers	Out-of-State Anglers	Total Anglers
Jan–Feb	1,056,089	524,560	1,580,649
Mar–Apr	1,628,637	674,118	2,302,755
May–Jun	1,812,886	744,989	2,557,875
Jul–Aug	1,593,960	780,785	2,374,745
Sep–Oct	1,231,794	433,910	1,665,704
Nov–Dec	1,129,852	450,213	1,580,065
Total	**8,453,218**	**3,608,575**	**12,061,793**

Source: NMFS 2007f

Note: Recorded participation is marine recreational fishing anglers visiting any marine fishing area comprising inland waters, the state territorial sea, and the EEZ. Numbers might not total exactly due to rounding.

to experience the effect. As such, socioeconomic data for Hillsborough, Manatee, and Pinellas counties compose the region of influence (ROI), are the principal focus of the following discussion, and are used as baseline conditions for the socioeconomic analysis.

Table 3.9-7 presents the total population, recent trends, and year 2010 population projections for Hillsborough, Manatee, and Pinellas counties and the state. The ROI will be measured using the totals for Hillsborough, Manatee, and Pinellas counties. All four geographical areas experienced population growth during the decade ending in 2000. The ROI had a 15 percent increase in population from 1990 to 2000 and is projected to increase more than 18 percent from 2000 to 2010. The rate of growth for the ROI was lower than the rate of growth for Florida, but continued to increase from 1990 to 2000. The rate of growth is projected to increase through 2010. The population of Manatee County grew at a faster rate than did the population of Florida during the decade ending in 2000; the population of Pinellas and Hillsborough counties grew at a slower rate. Population projections for the decade starting in 2000 indicate growth rates in Hillsborough and Manatee counties exceeding the projected rate of population growth for the state. The population of Pinellas County is projected to increase from 2000 to 2010, but at a lesser rate than from 1990 to 2000.

Table 3.9-7. Population, 1990 to 2010

	Hillsborough County	Manatee County	Pinellas County	ROI [a]	Florida
1990 [b]	834,054	211,707	851,659	1,897,420	12,937,926
2000 [c]	998,948	264,002	921,482	2,184,432	15,982,378
1990–2000 Change (%)	16.5 %	19.8 %	7.6 %	15.1 %	19.0 %
2010 Projected [d]	1,262,709	343,773	978,460	2,584,942	19,920,348
2000–2010 Change (%)	20.9 %	23.2 %	5.8 %	18.3 %	19.8 %

Sources: b. Census Bureau 1990, c. Census Bureau 2000, d. EDR 2007

Note: a. The ROI is composed of Hillsborough, Manatee, and Pinellas counties.

As shown by **Table 3.9-8**, the unemployment rates for Hillsborough, Manatee, and Pinellas counties; and the ROI declined between 1995 and 2000 with slight increases in unemployment between 2000 and 2005. Florida's unemployment decreased considerably between 1995 and 2000 and stabilized from 2000 to 2005. Unemployment rates for the three counties and the ROI were lower than Florida from 1995 to 2005, with the differences ranging from 0.2 percentage points to 2.5 percentage points. Hillsborough, Manatee, and Pinellas counties; the ROI; and Florida encountered significant increases in unemployment rates between 2005 and 2008.

Residents living in the ROI are more likely to be employed in the educational, health, and social services; and retail trade industries (see **Table 3.9-9**). A smaller percentage of residents in the ROI are employed in the professional, scientific, management, administrative, and waste management services and manufacturing industries. The same trends are true for state employment. Only 1 percent of the ROI residents are employed in the agriculture, forestry, fishing and hunting, and mining industries. The county with the highest percentage of residents in this industry is Manatee County, where the onshore pipeline would be constructed. **Table 3.9-10** lists the economic and business characteristics for the ROI, the State of Florida, and the United States.

Table 3.9-8. Unemployment Rates, in Percent for 1995 to 2006

Year	Hillsborough County	Manatee County	Pinellas County	ROI *	Florida
1995	4.5	4.4	4.1	4.3	6.1
2000	3.5	3.4	3.4	3.4	4.1
2005	3.8	3.6	3.6	3.8	4.0
2008	6.5	6.9	6.9	6.5	6.6

Source: BLS 2009

Notes:* The ROI is composed of Hillsborough, Manatee, and Pinellas counties.

Rates are for July of the indicated year. Rates are neither seasonally adjusted nor benchmarked.

Table 3.9-9. Employment by Industry

Economic and Social Indicators	Hillsborough County	Manatee County	Pinellas County	ROI *	Florida
Agriculture, forestry, fishing and hunting, and mining	1.1%	1.6%	0.2%	1.0%	1.3%
Construction	6.7%	9.2%	6.1%	7.3%	8.0%
Manufacturing	7.3%	11.7%	10.1%	9.7%	7.3%
Wholesale trade	5.3%	3.6%	3.7%	4.2%	4.0%
Retail trade	13.2%	14.3%	13.9%	13.8%	13.5%
Transportation and warehousing, and utilities	5.3%	3.8%	4.1%	4.4%	5.3%
Information	4.5%	2.0%	3.3%	3.3%	3.1%
Finance, insurance, real estate, and rental and leasing	10.1%	7.0%	9.3%	8.8%	8.1%
Professional, scientific, management, administrative, and waste management services	12.0%	9.6%	12.0%	11.2%	10.6%
Educational, health, and social services	17.3%	18.6%	18.9%	18.3%	18.1%
Arts, entertainment, recreation, accommodation, and food services	8.7%	9.0%	9.1%	8.9%	10.5%
Other services (except public administration)	4.5%	5.0%	5.3%	4.9%	5.1%
Public administration	4.0%	4.6%	4.0%	4.2%	5.2%

Source: Census Bureau 2000

Note: * The ROI is composed of Hillsborough, Manatee, and Pinellas counties.

Table 3.9-10. Economic and Business Characteristics of the ROI, the State of Florida, and the United States

	ROI *	Florida	United States
Private nonfarm establishments, 2004	65,395	484,938	7,387,724
Private nonfarm employment, 2004	980,589	6,864,987	115,074,924
Nonemployer establishments, 2004	162,399	1,369,002	19,523,741
Manufacturers shipments, 2002 ($1,000)	16,249,704	78,474,770	3,916,136,712
Retail Sales, 2002	$28,652,584	$191,805,685	$3,056,421,997
Retail Sales per capita, 2002	$35,899	$11,498	$10,615
Minority-owned firms, percent of total, 2002	41.1%	27.3%	17.8%
Women-owned firms, percent of total, 2002	82.0%	28.4%	28.2%
Housing units authorized by building permits, 2005	25,433	287,250	2,155,316
Federal funds and grants, 2004 ($1,000)	$15,885,915	$121,933,502	$2,143,781,727

Source: Census Bureau 2007

Note: * The ROI is composed of Hillsborough, Manatee, and Pinellas counties.

Table 3.9-11 presents selected housing statistics. In 2000, occupied housing accounted for 918,785 units of the 1,045,663 total units in the ROI. In the ROI, rental units accounted for more than 68 percent of the occupied units, slightly lower than the state proportion (70 percent). The median monthly rent in the ROI, at $625, was slightly lower than the median rent for the state ($641).

Table 3.9-11. Housing Data for 2000

	Hillsborough County	Manatee County	Pinellas County	ROI [a]	Florida
Total Units	425,962	138,128	481,573	1,045,663	7,302,947
Occupied Units	391,357	112,460	414,968	918,785	6,337,929
Owner-Occupied	250,995	82,947	293,866	627,808	4,441,799
Renter-Occupied	140,362	29,513	121,102	290,977	1,896,130
Vacant Units	34,605	25,668	66,605	126,878	965,018
Seasonally Vacant Units [b]	6,068	16,845	34,111	57,024	482,944
Vacancy Rate – Homeowner	1.9	2.5	2.3		2.2
Vacancy Rate – Rental	8.9	10.1	10.2		9.3
Median Value ($)	91,800	96,000	85,600	91,133	93,200
Median Monthly Rent ($)	623	637	616	625	641

Source: Census Bureau 2000

Notes:

a. The ROI is composed of Hillsborough, Manatee, and Pinellas counties.

b. Vacant for seasonal, recreational, or occasional use.

The 2000 census recorded 1,045,663 total housing units in the ROI, of which 918,785 units were occupied. The proportion of occupied rental units to total occupied units was approximately 12 percent, which is comparable to that of the state, at approximately 13 percent. In 2000, the median monthly rent in Hillsborough County was $623, approximately 3 percent lower than the median monthly rent in Florida at $641.

Sand Resources. Tourism is an important industry in the ROI, especially on Anna Maria Island which includes the cities of Anna Maria, Holmes Beach, and Bradenton Beach and also the Town of Longboat Key. Anna Maria Island and Long Boat Key are located upon a barrier island just west of the Bradenton-Sarasota Metropolitan area. The white sandy beaches of this area are part of the draw for tourists. Both Anna Maria Island and Long Boat Key have beach management plans in place to ensure that a proper beach width is maintained to protect beach front property from destruction and nearby evacuation routes from flooding, and also to preserve the beaches that attract tourists to the region (Robinson et al. 2001).

Sand for beach renourishment projects is acquired from offshore sand deposits, ongoing dredging operations, and onshore sources. Sand provided by ongoing dredging options is the most economically viable option. The sand used for beach renourishment is a byproduct of the dredging operation and can be used to complete the Project. Resources acquired via this method are contingent upon ongoing dredging operations and the quantity of material being dredged. Acquiring sand from onshore sources and delivering to the beach by truckload tends to be extremely expensive, but if offshore sand resources do not exist this may be the only option. Sand, dredged for the purpose of renourishment, from offshore sources and then deposited onto nearby beaches is the most common method of beach renourishment.

Anna Maria Island and Longboat Key have been replenishing their beaches at various intervals and levels since 1993. Numerous major beach renourishments have occurred on Anna Maria Island and Longboat Key, the volumes and costs are listed in **Table 3-9.12** (Murley et al. 2003).

Table 3-9.12. Anna Maria Island and Long Boat Key Beach Renourishment Projects, 1993-2006

Year	Volume Renourished (cubic yards)	Length of Beach Renourished (miles)	Total Cost (dollars)
Anna Maria Island			
1993	2,300,000	4.6	9,300,000
2002	1,900,000	5.2	9,900,000
2006	213,000	4.6	3,400,000
Longboat Key			
1993	3,360,000	9.3	N/A
1997	891,000	3.1	N/A
2006	1,790,000	9.8	N/A

Source: Murley et al. 2003

These projects are large capital investments and in the interest of preserving upland property and reducing major disasters the Federal government helps offset the costs. The Federal government pays around 50 percent of the cost of the Project and the remaining 50 percent is split between the local municipality, the county, and the state. The beach renourishment projects on Anna Maria Island have accepted Federal funds where as Longboat Key has not pursued Federal funds for their restoration projects, citing additional requirements posed by the government as the inhibiting factor (Port Dolphin 2008a).

3.9.2.2 Environmental Justice

This section presents the demographic data to identify potential environmental justice impacts associated with the Project. An area is considered to have a disproportionately high percentage of low-income or minority residents under either of two conditions: (1) if the percentage of low-income or minority populations within that area is substantially greater than the county or state minority percentage or low-income percentage, or (2) the percentage of persons in low-income or minority populations within the area is greater than 50 percent.

Census data on 2000 racial and ethnic make-up for Hillsborough, Manatee, and Pinellas counties and the state are presented in **Tables 3.9-13** and **3.9-14** summarizes income and poverty characteristics. The ROI does not have disproportionately higher proportions of minority and low-income residents compared to Florida. Although, the percentage of Black and Hispanic or Latino residents in Hillsborough County is slightly higher than the percentage for the ROI and state, Hillsborough County also has the highest median household income, and the percentages of individuals living in poverty is the same as the State and only slightly higher compared to the other counties in the ROI, the ROI, and the state. The poverty level for the United States in 1999 was 12.4, slightly lower than the Hillsborough County and state level but higher than the level for Manatee and Pinellas counties (Census Bureau 2000).

Table 3.9-13. Race and Ethnicity, by Percent in 2000

	Hillsborough County	Manatee County	Pinellas County	ROI [a]	Florida
White	75.2	86.4	85.9	82.5	78.0
Black [b]	15.0	8.2	9.0	10.7	14.6
American Indian and Alaska Native	0.4	0.3	0.3	0.3	0.3
Asian	2.2	0.9	2.1	1.7	1.7
Other Race	4.7	2.8	1.1	2.9	3.0
Two or More Races	2.6	1.4	1.6	1.9	2.4
Hispanic or Latino [c]	18.0	9.3	4.6	10.6	16.8

Source: Census Bureau 2000

Notes:

a. The ROI is composed of Hillsborough, Manatee, and Pinellas counties.

b. Having origins in any of the black racial groups of Africa.

c. Hispanic origin, could be of any race.

Table 3.9-14. Income and Poverty, in 1999

	Hillsborough County	Manatee County	Pinellas County	ROI *	Florida
Median Household Income	$40,663	$38,673	$37,111	$38,816	$38,819
Per Capital Income	$21,812	$22,388	$23,497	$22,566	$21,557
Individuals Living in Poverty (%)	12.5	10.1	10.0	10.9	12.5

Source: Census Bureau 2000

Note: * The ROI is composed of Hillsborough, Manatee, and Pinellas counties.

3.10 Navigation and Transportation

3.10.1 Definition of the Resource

Marine transportation includes all vessels that use the channels and navigable waterways within the area adjacent to and in the vicinity of the Port. This includes marine traffic to and from the onshore staging area during construction and between the Port and onshore ports for supplies during operation. Within this region of Tampa Bay, marine transportation includes a variety of vessels engaged in commercial, recreational, Federal, and state functions.

Onshore transportation refers to the movement of ground-based motor vehicles and supporting infrastructure. This category is dominated by privately owned cars; commercial trucks, busses, and trains; and the supporting road, parking, and railroad track networks. The areas required for the onshore portions of the Project and its alternatives are limited to the temporary staging areas necessary to construct the offshore facility, the selected port with merchants capable of providing supplies to restock the moored vessels, and the roadway system serving those staging areas and supply locations.

For this Project, the affected environment for transportation and navigation includes those onshore, near-shore, and offshore components that could be directly or indirectly impacted. These areas include vessel traffic in Tampa Bay and nearby shipping lanes in the GOM, ports in the Tampa Bay area, and roadways and railways that could be used to deliver construction materials or personnel.

3.10.2 Vessel Traffic

Tampa Bay is approximately 6 to 7 miles wide and 20 miles long, and provides access to two major ports, the Port of Tampa and Port Manatee, and one small port, the Port of St. Petersburg. Water depths in Tampa Bay vary significantly from one location to another, but are generally shallow with depths less than 15 feet except where dredging has occurred for vessel transit (NRL 2005). A large variety of vessel traffic occurs in Tampa Bay, including commercial shipping; commercial fishing; recreational fishing; and the operation of charter vessels engaged in fishing, diving, and dolphin watching. In addition, several cruise lines operate out of Port of Tampa (TPA 2008).

As shown in **Figure 2.3-2**, the main shipping fairway, Egmont Channel, enters the offshore area of Tampa Bay from the eastern GOM. It is dredged and maintained to 6 miles west off the coast of Florida to a water depth of 13 m (43 feet), ending just west of Egmont Key (TPA 2008). Egmont Channel extends between Mullet Key and Egmont Key and dredged cuts leading up the bay through Tampa Bay, Hillsborough Bay, and Old Tampa Bay to Port Manatee, Big Bend, Alafia River, Port Sutton, Tampa, Port Tampa, and Weedon Island. Egmont Channel is used by all deep-draft vessels entering Tampa Bay (NOAA 2008). **Table 3.10-1** shows the number of vessel trips along Egmont Channel to their respective port of call (Port Manatee, Port of Tampa, or Port of St. Petersburg) for Fiscal Year (FY) 2005 through FY 2008. A vessel entering Tampa Bay and proceeding to its respective port of call, conducting its port business, and then leaving the Port and exiting Tampa Bay, would be two vessel trips.

The following types of vessels conducted the trips along Egmont Channel to Port Manatee and the Port of Tampa shown in **Table 3.10-1** (Davis 2009 and Higgins 2009):

- Liquid bulk vessels such as product and crude tankers, which carry petroleum, sulfur, or other liquid bulk
- Dry bulk vessels such as bulk vessels, bulk containerships, cement carriers, ore carriers, and wood-chip carriers

Table 3.10-1. Vessel Trips along Egmont Channel to Port Manatee, Port of Tampa, and Port of St. Petersburg from FY 2005 to FY 2008

Year	Port Manatee	Port of Tampa [a]	Port of St. Petersburg [b]	Total Trips Along Egmont Channel
FY 2005	1,032[c]	7,376	60	**8,468**
FY 2006	786[c]	7,398	60	**8,244**
FY 2007	740[c]	7,162	60	**7,962**
FY 2008	1,064[a]	6,832	60	**7,956**

Sources: a. TPA 2009, b. McGowan 2008 (Port of St. Petersburg vessel trips are approximate), c. Higgins 2009

- Barges that carry liquid or dry bulk such as petroleum, dry bulk goods, or scrap materials
- Tugs used to tow the liquid or dry bulk barges
- Cruise ships
- Crew boats
- General cargo vessels such as general cargo carriers, partial containerships, refrigerated ships, barge carriers, and livestock carriers
- Other types of vessels such as roll-on/roll off vessels that are designed to carry wheeled cargo such as automobiles, trailers, or railroad cars; container vessels such as container carriers and refrigerated container carriers; and combination vessels such as ore/bulk/oil carriers.

The largest percentage of vessels trips along Egmont Channel to Port Manatee in FY 2008 were by general cargo vessels (30 percent) followed by tugs (28 percent). The largest percentage of vessels along Egmont Channel to the Port of Tampa in FY 2008 was by the types of vessels listed under other vessels above (35 percent) followed by tugs (30 percent). The Port of St. Petersburg does not accept the types of vessels listed above due to the small size of the port (see **Section 3.10.2.3**). The Port of St. Petersburg maintains permanent berthing for vessels such as large (approximately 280 feet) personal yachts, small cargo vessels, USCG vessels, and research vessels (McGowan 2008).

Table 3.10-2 shows the number of vessels registered in 2008 in the counties of Manatee, Hillsborough, and Pinellas, which surround Tampa Bay. Most vessels are Class 1 (i.e., between 16 and 25 feet 11 inches long). As shown in **Table 3.10-2**, most vessels registered in the counties surrounding Tampa Bay are for recreational use (approximately 98 percent).

Most recreational boating involves fishing, cruising, and nature viewing. Vessel types include various sized power boats, sailboats, kayaks, and fishing boats. Frequent destinations within the Tampa Bay region are Terra Ceia Bay, Egmont Key, and the Sunshine Skyway Bridge. See **Section 3.6** for more information on recreational areas. Boaters use routes within the bay and offshore areas that center on their intended activity. Divers tend to travel farther into the GOM to reach their destination whereas nature viewers remain closer to islands and the coastal area. The highest density of departures for southern Tampa Bay is from Anna Maria Island and the most densely used transit routes are within southern Tampa Bay (Sidman et al. 2004).

A large tourism-based economy supports a charter boat industry for visitors who want to experience ocean-based activities. Within the Tampa Bay region, numerous charter companies and private captains offer individual or group experiences in fishing, diving and snorkeling, cruising, gambling,

Table 3.10-2. Number of Vessels Registered by Class in Hillsborough, Manatee, and Pinellas Counties in 2008

Vessel Class (and Size)	Hillsborough County	Manatee County	Pinellas County	Three-County Total
Recreational Vessels				
Class A-1 (< 12 feet)	8,568	3,241	10,955	22,764
Class A-2 (12–15 feet 11 inches)	10,679	4,039	8,727	23,445
Class 1 (16–25 feet 11 inches)	23,038	9,948	26,737	59,723
Class 2 (26–39 feet 11 inches)	3,149	1,872	6,303	11,324
Class 3 (40–64 feet 11 inches)	601	337	982	1,920
Class 4 (65–109 feet 11 inches)	33	7	29	69
Class 5 (> 110 feet)	5	0	3	8
Canoes	615	199	730	1,544
Subtotal	*46,688*	*19,643*	*54,466*	*120,797*
Commercial Vessels				
Class A-1 (< 12 feet)	59	50	74	183
Class A-2 (12–15 feet 11 inches)	138	86	145	369
Class 1 (16–25 feet 11 inches)	457	321	610	1,388
Class 2 (26–39 feet 11 inches)	134	105	358	597
Class 3 (40–64 feet 11 inches)	79	45	133	257
Class 4 (65–109 feet 11 inches)	37	10	23	70
Class 5 (> 110 feet)	1	0	0	1
Canoes	2	1	2	5
Subtotal	*907*	*618*	*1,345*	*2,870*
Total of Recreational and Commercial Vessels	**47,595**	**20,261**	**55,811**	**123,667**

Source: FHSMV 2008

dolphin-watching, harbor touring, kayaking, nature-viewing, and bird watching. As illustrated in **Table 3.10-2**, of the 123,667 registered vessels in Hillsborough, Manatee, and Pinellas counties, 2,870 are considered commercial and include charter vessels and commercial fishing vessels (FHSMV 2008). Impacts on the navigation and traveling routes used by recreational and commercial vessels from pipeline operations are discussed in **Section 4.10**.

3.10.2.1 Port Manatee

Port Manatee is on the southeastern shoreline of Tampa Bay in Manatee County in a predominantly commercial and industrial area and is not situated near recreational or tourist attractions (MCPA 2009a). Port Manatee serves the counties of Lee, Charlotte, DeSoto, Sarasota, Hardee, Polk, Hillsborough, Pasco, Hernando, Pinellas, and Manatee (FSTEDC 2008). Port Manatee is accessed through the shipping channel for Port Manatee, which is a 4.8-km- (2.9-mi-) long, 12-m- (40-foot-) deep mean low water harbor channel which branches off Egmont Channel to the southeast.

Port Manatee is presently a deepwater cargo port, although it has supported cruise operations in the past. Port Manatee services a variety of break-bulk cargo commodities, which is led by the import of perishables, forest products, steel, and nonferrous metals. Bulk commodities include finished phosphate products, cement and cement clinkers, refined petroleum, and a growing range of construction-grade aggregates. Phase One of Port Manatee's $125 million expansion project was completed in 2007. Key components of the entire expansion project include one-half mile of new deepwater berthing and modern docks and new navigational safety features including a 1,300-foot-diameter turning basin and improved turning configuration where the port's channel intersects the main Tampa Bay Shipping Channel (MCPA 2009b). In FY 2008 Port Manatee handled 8.3 million short tons of cargo which was managed by 62 full-time employees and an estimated 1,100 on-Port employees (MCPA 2009c). **Table 3.10-3** presents the types of vessels that called on Port Manatee in FY 2008. As shown in **Table 3.10-3**, Port Manatee is busiest from August to October.

Table 3.10-3. Port Manatee Vessel Calls by Vessel Type for FY 2008

Month	Liquid Bulk	Dry Bulk	General Cargo	Barges	Tugs	Crew Boats	Total
January	0	8	10	3	4	0	**25**
February	1	9	14	3	6	0	**33**
March	1	7	21	2	3	0	**34**
April	1	3	16	6	5	1	**32**
May	4	4	12	6	6	2	**34**
June	1	4	11	5	5	0	**26**
July	3	8	9	13	13	0	**46**
August	0	2	14	26	27	0	**69**
September	0	4	19	28	28	0	**79**
October	1	4	12	24	24	0	**65**
November	2	1	11	10	13	3	**40**
December	3	4	13	14	15	0	**49**
Total Calls	**17**	**58**	**162**	**140**	**149**	**6**	**532**

Source: Higgins 2009

Note: Liquid Bulk includes liquid bulk barges and liquid bulk tankers. Dry bulk includes dry bulk barges and dry bulk tankers.

3.10.2.2 Port of Tampa

The Port of Tampa is the largest port in Florida as measured by tonnage and area, and handles a variety of cargo and cruise operations (FSTEDC 2008). The Port of Tampa serves Hillsborough, Hernando, Pasco, Pinellas, and Polk counties. The Port of Tampa is a major port of entry for the fuel and building materials used in the region and is also a popular cruise port, serving the expanding Western Caribbean market. The Port of Tampa has a current annual economic impact of $7.8 billion, which includes 96,000 jobs. Approximately 782,000 revenue-generating cruise passengers used the Port of Tampa in FY 2006 and 2007, and 1.0 million are projected for FY 2011/2012 (FSTEDC 2008). **Table 3.10-4** presents the types of vessels that called on the Port of Tampa in FY 2008. The Port of Tampa is surrounded by a residential population and a variety of tourist attractions (TPA 2008).

Table 3.10-4. Port of Tampa Vessel Calls by Vessel Type for FY 2008

Vessel Type	Number of Calls
Barge	1,003
Cruise*	179
Tugs	1,022
Other Vessels	1,212
Total Calls	**3,416**

Source: TPA 2009

Note: * Includes cruise vessels that dry-docked for repairs

3.10.2.3 Port of St. Petersburg

The Port of St. Petersburg is off the west coast of Tampa Bay. It is not considered a true deepwater port and does not provide berths for standard-sized cargo vessels, such as the cargo vessels that dock at Port Manatee and Port of Tampa (McGowan 2008), due to a controlling water depth of approximately 7.0 m (23 feet) within the port basin and lesser depths along the eastern edge of the port basin (NOAA 2008). The port maintains permanent berthing for vessels such as large (approximately 280 feet) personal yachts, small cargo vessels, USCG vessels, and research vessels from the University of Southern Florida (McGowan 2008). Approximately 30 vessels use the Port of St. Petersburg annually (McGowan 2008).

3.10.3 Roadways

I-75 is the major north-south interstate highway through the Tampa area. I-4, which ends in Tampa, and I-10 are the major east-west highways. I-275 connects Tampa across Old Tampa Bay to St. Petersburg, and St. Petersburg across Tampa Bay to the Terra Ceia area, just south of Port Manatee. U.S. Highway 41 provides access to Port Manatee and is directly accessible by I-275 and indirectly accessible by I-75 and I-4.

Semi-trucks are the solitary mode of transportation for 6 million of the total 7 million tons of cargo that move through Port Manatee annually; therefore the existing conditions of Port Manatee include significant truck traffic (FDOT 2005). U.S. Highway 41 provides access to Port Manatee from 1-275. I-275 is south of Port Manatee, and provides access to the western side of Tampa Bay via the Sunshine Bridge. Vehicles access Port Manatee from U.S. Highway 41 via Piney Point Road.

The portion of U.S. 41 which provides access to Port Manatee from I-275 has average daily vehicle traffic of 10,300 vehicles or 3.8 million vehicles annually. Semi-truck traffic accounts for approximately 15 percent (1,545 vehicles) of the daily traffic along this stretch of U.S. Highway 41. Piney Point Road, which provides access to Port Manatee from U.S. Highway 41, has an average of 2,900 vehicles daily or 1.1 million vehicles annually. Approximately 13 percent of this daily traffic (377 vehicles) is semi-truck traffic. I-75 has an average traffic count of 10,001 to 15,000 semi-trucks daily. Between 501 and 1,500 semi-trucks use U.S. Highway 41 north of Piney Point Road daily, and 1,501 to 3,500 semi-trucks cross the Sunshine Bridge daily on I-275 and proceed north on U.S. Highway 41 to Piney Point Road (FDOT 2008a). The flow of automobile traffic heading into Port Manatee has recently been modernized due to the opening of Port Manatee's Access Control Center. It is located at the port's north entrance and features multiple drive-through lanes, as well as a main building that streamlines surveillance, identification badge authorization, and visitor screenings. The Access Control Center has simplified access to the Port and allows a smoother flow of traffic from U.S. Highway 41, which is just outside the main entrance (MCPA 2009b).

3.10.4 Railways

The CSX Railroad handles more than 1.4 million carloads of freight annually in all of Florida (CSX 2008). The major products shipped via railcar include coal, orange juice, sugar, fertilizer, feed, phosphate, limestone, new and used cars, and aggregates. The CSX Railroad also provides railway access to the Port of Tampa and Port Manatee (CSX 2008, MCPA 2009b). Port of Tampa is an intermodal terminal, meaning that the facility is designed for loading and unloading containers and trailers to and from the railroad and street or highway (CSX 2008). Port Manatee owns approximately 8 miles of railroad track that also service an intermodal center (MCPA 2009b).

4. Environmental Consequences

This section presents an analysis of the potential direct and indirect impacts each alternative would have on the affected environment, as characterized in **Section 3**. Alternatives considered include the No Action Alternative, deepwater port concepts, alternative vaporization technologies, alternative pipeline routes, alternative anchoring methods, and pipeline construction methods (see **Table 2.1-1** in **Section 2.1**). Each alternative carried forward for detailed analysis in this EIS was evaluated for its potential to produce environmental impacts.

Direct impacts are caused by the action and occur at the same time and place. Indirect impacts are caused by the action and are later in the time or are farther removed in distance, but are still associated with the action. Impact characteristics (i.e., minor, moderate, or major) as described in **Section 1.4**, have several impact attributes including (1) duration (i.e., short-term, long-term), (2) mechanism (i.e., direct, indirect), (3) magnitude (classifications ranging from minor to major), and (4) whether an impact is adverse or beneficial. The evaluation criteria upon which impact determinations are made are presented in **Table 4.0-1.** Determination of the significance of impacts also considers two critical NEPA-based factors as given below.

Context – where an impact can be determined to be localized or more widespread (e.g., regional). While the definition of the term "local" (or localized) can vary by resource, it can be broadly defined as one that occurs within an established regulatory limit (e.g., 100-m (328-foot) mixing boundary or within approximately 10 km (6 mi) of the source). "Regional" impacts are broadly defined as those that occur on the order of 100 km (62 mi) or more from the source.

Intensity – where an impact is determined through consideration of several factors, including whether a proposed action might have an adverse impact on the unique characteristics of an area (e.g., historical resources, ecologically critical areas), public health or safety, threatened or endangered species, or designated critical habitat. Impacts are also considered in terms of their potential for violation of Federal, state, or local environmental law; their controversial nature; the degree of uncertainty or unknown impacts, or unique or unknown risks; if there are precedent-setting impacts; and their cumulative impacts (see **Section 6**).

The evaluation criteria summarized in **Table 4.0-1** provide a framework for establishing context and intensity. These evaluation criteria were developed by environmental professionals in the respective fields in coordination and consultation with stakeholder agencies. Although some evaluation criteria have been designated based on legal or regulatory limits or requirements, others are based on best professional judgment and best management practices. The evaluation criteria include both quantitative and qualitative analyses, as appropriate to each resource.

Section 4.11 outlines potential minimization and mitigation techniques. Various Federal and state agencies have requested specific measures including monitoring in order to minimize or offset potential impacts on natural resources. The Applicant has also committed to several BMPs and minimization practices during construction and operations to reduce potential impacts, which are also presented in **Section 4.11**.

4.1 Water Resources

The following discussion of water quality impacts includes an analysis of impacts and a determination of impact duration and severity. Included in the discussion are elements of the project description that

Table 4.0-1. Evaluation Criteria for Determining Environmental Consequences by Resource Area

Resource	Evaluation Criteria
Water Resources	• Violate a Federal, state, local, or federally recognized international water quality criterion or waste discharge requirement (major) • Cause irreparable harm to human health, aquatic life, or beneficial uses of aquatic ecosystems (major) • Degrade marine, coastal, or terrestrial (lakes, rivers, wetlands, tidal environments) water quality (minor to major depending on extent of degradation)
Biological Resources	• Violate a legal standard for protection of a species or its critical habitat (major) • Degrade the commercial, recreational, ecological, or scientific importance of a biological resource or its critical habitat (minor to major depending on extent of degradation) • Measurably change the population size (density) or change the distribution of an important species in the region (minor to major depending on extent of change)
Cultural Resources	• Potential to impact submerged cultural resources in or adjacent to Tampa Bay (minor to moderate depending on extent of adverse impact) • Irretrievable or irreversible damage to a prehistoric or historic property that is listed or eligible for listing on the NRHP (major) • Adversely impact a prehistoric or historic property that is listed or eligible for listing on the NRHP (minor to moderate depending on extent of adverse impact)
Geological Resources	• Destruction of unique geological features (major) • Increased erosion potential (minor to moderate depending on extent of increase) • Siting facilities to prevent recovery of mineral resources (minor to moderate) • Increased potential for geologic hazards, such as seismicity (minor to major depending on extent of increase) • Alteration of the soil composition, structure, or function within the environment (minor to moderate depending on extent of alteration)
Marine Areas and Land Use	• Alter the functional use of an area already used (minor to major depending on the current use) • Impacts on prime farmland (moderate) • Impacts on existing residences or businesses (moderate to major)

Resource	Evaluation Criteria
Recreation and Aesthetics	• Interference with access to coastal recreational shorelines or waterways (minor to moderate depending on extent of alteration) • Loss or displacement of an important recreational resource, such as impairment of recreational fishing activities and other water-dependent uses (minor to major depending on extent of alteration) • Degradation of recreational value (moderate) • Alter or impair a viewshed, scenic quality, or aesthetic value not consistent with applicable laws or regulations (minor to major depending on extent of alteration)
Air Quality	• Cause or contribute to a violation of any NAAQS (major) • Cause or contribute to a violation of a Class I or Class II increment (major) • Cause an adverse impact on AQRV in a Class I area (moderate to major) • Expose sensitive receptors to substantially increased pollutant concentrations (minor to major) • Increase emissions of criteria pollutants beyond limits allowed under CAA regulations (major) • Substantially increase the emissions of greenhouse gases (minor to moderate)
Noise	• Substantial change in existing ambient noise levels on land (which could impact humans) or underwater (which could impact biological resources) (minor to moderate depending on change) • Violation of state or local noise ordinances, limits, or standards, or applicable land use compatibility guidelines (minor to moderate depending on violation)
Socioeconomics and Environmental Justice	• Substantial change to the local or regional economy, population, housing, infrastructure (schools, police, and fire services), social conditions, or employment (major) • Disproportionate environmental health or safety risk to children (minor to major depending on risk and scope of impact) • Disproportionate environmental, economic, social, or health impacts on minority or low-income populations (minor to major depending on risk and scope of impact)
Navigation and Transportation	• Long-term interference with access to transportation routes (minor to major) • Permanent decrease in Level of Service of key transportation arteries (minor to major) • Substantial increased risks of collisions or other mishaps (e.g., grounding) (minor to major depending on risk)

Note: Impact characteristics (i.e., minor, moderate, or major) as discussed in the table above provide a framework for establishing context and intensity. The evaluation criteria include both quantitative and qualitative analyses, as appropriate to each resource.

would produce impacts and are proposed to minimize potential impacts. Applicant-proposed measures for minimizing potential environmental impacts are those that have been committed to by the Applicant and incorporated into the project design, and are listed in **Section 4.11**. Additional measures that are recommended by lead or cooperating agencies to mitigate potential adverse impacts, are also stated in **Section 4.11**.

This section addresses potential impacts on water resources associated with the Project, alternatives considered, and the No Action Alternative. As discussed in **Section 3.1**, the Project area encompasses areas within the GOM, Tampa Bay, and a 6.2-km (4-mi) onshore pipeline corridor. Because the Project area encompasses three distinct geographic areas, resources that might be impacted include water quality in marine, estuarine, and terrestrial (including wetland and groundwater) environments.

The potential impacts on water quality would be from the temporary resuspension of sediments and increases in turbidity in the water column during offshore Port and pipeline installation; erosion and generation of sediments in surface waterbodies during construction of the onshore portion of the pipeline; the discharges of water from hydrostatic testing of the pipelines; and the discharges from construction and support vessel engine-cooling water, barge and carrier deck drains, discharge of cooling water at elevated temperatures during operations, and other miscellaneous drains during Port construction and operations.

The offshore portion of the project would not degrade marine water quality or cause irreparable harm to human health, aquatic life, or beneficial uses of the aquatic ecosystem. Similarly, the onshore portion of the project would not degrade groundwater, surface water, or wetland water quality or cause irreparable harm to human health, aquatic life, or beneficial uses of the aquatic ecosystem. No Federal or state water quality criteria or water discharge criteria would be violated.

4.1.1 Impacts of the Proposed Action

4.1.1.1 Construction

SRV Construction. The SRVs would not be constructed within the Project area, thus adverse impacts on the sediment and water column of the Gulf during construction of the SRVs would not occur.

Proposed Port Construction. The Port would require construction of an STL subsea system that consists of a permanently installed anchoring system for the two off-loading buoys and eight mooring lines for each of the two SRVs. Each buoy would be connected to a flexible riser that would act as a gas transmission line between the SRV and the PLEM. Each PLEM would connect to a flowline that leads to a piggable-Y, at which point both STL systems would be connected to the single gas transmission pipeline that would lead onshore.

Fabrication of the Port components would occur offsite at manufacturing facilities, and the components would be transported to Port Manatee for storage prior to construction. All Port components would be transported to the offshore installation site by deck cargo barge, and offloaded by crane vessel. Onsite installation of the Port would take approximately 6 months. Construction activities would involve the use of derricks, barges, and pipelaying vessels to install the two STL buoy systems, riser pipelines, gas flowlines, and associated anchoring and mooring lines. These actions would result in increases in turbidity from sediment disturbance during placement of the anchors and laying of equipment on the seafloor. Modeling of the turbidity and sediment suspension associated with offshore pipeline construction (discussed below) determined that the distance, duration, and thickness of sedimentation associated with seafloor trenching activities would be small and temporary. Due to the short-term nature and more limited seafloor disturbance associated with the Port construction activities, minor, short-term direct adverse impacts on water quality during installation of the Port would be expected. Installation of

the mooring anchors as well as placement of the mats for manifolds and risers at the buoy sites would result in a localized and temporary disturbance to the sediment, causing short-term sediment resuspension in the water column. FDEP standards regarding turbidity due to suspension of sediment at the Port location would not be applicable to the construction of the Port. This is because the maximum distance of sediment deposition associated with seafloor trenching is estimated to be less than 2 km (1.2 mi), while the Port is located more than 28 km (17.8 mi) outside of state waters.

Construction of Proposed Offshore Pipeline Route. Installation of the gas transmission pipeline, two riser manifolds, and the gas flowlines would be performed predominantly by using a plow to dig a trench within seafloor sediments. This process would adversely impact water quality by increasing turbidity and suspending sediments within the water column along the proposed pipeline route.

The entire length of the offshore portion of the pipeline would be 67.6 km (42 mi), and would include portions in both Federal and state waters, including portions of Tampa Bay designated as OFW (as discussed in **Section 3.1.3.3**, and shown in **Figure 2.3-2**). The construction of the offshore portion of the pipeline would be accomplished using a variety of techniques, depending on the nature of the seafloor at various locations. Options for pipeline burial include various methods of digging a trench in the seafloor, such as plowing and dredging. In locations where sediment thickness does not allow for full burial, the pipeline would be covered by concrete mattresses. At three locations (the approach to the onshore connection, and the two crossings of the Gulfstream pipeline) the pipeline would be installed using HDD technology. All of these activities would result in disturbance of the sediment present at the work location.

The adverse impacts resulting from the pipeline installation would vary depending on the type of sediment disturbed, and the potential for disturbance of contaminated sediments. For the location of the STL buoys and the offshore portions of the pipeline, the sediments consist of fine quartz sand, coarse sand, and gravel-sized carbonates. Due to the large grain size of these sediments, individual particles would resettle to the bottom rapidly. This would result in the adverse impact having a very short duration, and would also result in the sediments not traveling very far from the site of disturbance. For the pipeline sections closer to Lower Tampa Bay, the sediments contain a larger percentage of silts and clays which would remain in suspension longer, and travel farther, than the offshore sediments. Therefore, the duration, horizontal extent, and contamination levels associated with pipeline installation in this area would be greater than that offshore.

The impacts of sediment suspension were modeled by the Applicant using the SSFATE model (ASA 2008). This modeling was performed to estimate the suspended sediment concentration, and the transport and deposition of sediment, resulting from pipeline construction and operation. A workplan for the modeling effort was developed by the Applicant to define the objectives, procedures, and input parameters to be used. The workplan was technically reviewed, and comments were provided before approval to verify that the proposed modeling was consistent with other similar studies. The results were provided in a narrative report (ASA 2008), were reviewed and evaluated, and were judged to be accurate and representative.

The adverse impacts from three separate construction activities were evaluated in the model: the releases of HDD drilling fluid, the use of a clam shell dredge to excavate the exit hole for the HDD locations, and the use of a mechanical plow or hydraulic jet to install pipeline sections. The model was used to estimate the area in which sediment concentrations would continue to exceed 100 mg/L after 30 minutes. The total areal extent of the turbidity plumes created during pipeline installation would be approximately 1,894 hectares (4,679 acres) (ASA 2008). The turbidity plumes would be short-lived and remain fairly close to their source. However, the duration of the exceedance was predicted to be limited to less than 2 hours for the worst-case condition. In addition, although sediment deposition of up to 15 mm (0.6 in)

was predicted locally, the majority of the affected area would receive less than 2 to 3 mm of sediment (ASA 2008). The magnitude and duration of these adverse impacts is small and temporary.

Modeling performed for the installation of the Gulfstream pipeline through this same area of Tampa Bay was also reviewed. For the Gulfstream project, the Final EIS (FERC 2001b) developed by the FERC concluded that disturbance of sediment would result in exceedances of the Florida state water quality standard of 29 nephelometric turbidity unit (NTU) for turbidity over a relatively small area, and for a short period of time. The model predicted that the area exceeding the turbidity standard at any given time would cover an area of 0.9 acres. Also, the model predicted that the longest length of time any given location would be exposed to an exceedance of the turbidity standard would be 10 hours. Therefore, the FERC concluded that the overall impact from pipeline construction would be minimal (FERC 2001b).

Extending this conclusion to the current Port Dolphin Project would require that the location, construction method, and construction duration for both Projects is approximately the same. Based on a review of the Gulfstream EIS, it appears likely that the Port Dolphin pipeline route would have smaller adverse impacts than those evaluated for the Gulfstream pipeline. This is because the Gulfstream pipeline was constructed directly through a 5.9-km (4-mi) portion of the Terra Ceia AP Tampa Bay, while the Proposed Route Alternative for the Port Dolphin pipeline does not enter the preserve (Port Dolphin 2007c).

Based upon this analysis, direct adverse impacts on water quality would be expected during the construction of the offshore portion of the pipeline. The impacts would result from the disturbance of seafloor sediment during construction. Due to the short-term duration of the construction activities, and the minimal amount of sediment resuspension anticipated, minor, adverse short-term impacts on water quality during installation of the pipelines would be expected. Contraventions of the FDEP requirements for OFW or toxic pollutants, and other water quality parameters are not anticipated during construction of the pipelines.

Adverse impacts on water resources would be further reduced by the use of BMPs proposed by the applicant and presented in **Section 4.11** and adherence to all applicable laws, regulations, industry standards, and recommended mitigation measures.

Offshore Hydrostatic Testing. Gauging and hydrostatic testing of the offshore portion of the pipeline could result in adverse water quality impacts due to the discharge of water that contains hazardous chemicals or reduced oxygen levels, or has otherwise been affected by its use in the testing process.

Gauging and hydrostatic testing would be required following the installation of the gas transmission line and all associated components. There would be two flushing events for the pipeline. The pipeline would first be filled with filtered seawater; then a pig would be passed through the pipe by flushing with water from behind the pig. Each flushing would constitute a volume of approximately 12.3 million gallons of filtered seawater, for a total of 24.6 million gallons. To assist in leak detection during testing, a fluorescent dye (Champion Fluorescent Dye or similar) would be added to the filtered seawater at an average concentration of 450 ppm. Also, a corrosion inhibitor (HydroHib P) would be added to the water. The water would be discharged at the location of the PLEM offshore.

The adverse impacts could potentially occur if the water quality of the hydrostatic test water were to be affected by added chemicals, or were to be modified (deprived of oxygen or charged with hydrogen sulfide) during the test period. Should these changes occur, the discharged water would mix with ambient water, reducing water quality within the mixing zone. To reduce the potential for adverse impacts, the Applicant has proposed to use dye and corrosion inhibitor that are nontoxic. In addition, the discharge would be performed in compliance with the NPDES permit for the Port Dolphin facility. Should water with impacted quality still be discharged, even with these precautions, the 12.3 million gallons of

discharge would be a relatively small volume of discharge in an offshore area, and would rapidly become diluted.

Direct adverse impacts on water quality would be expected during the hydrostatic testing of the pipeline. The impacts would result from the introduction of chemicals into the test water, modifications in the chemistry of the test water during the test (such as reduction in oxygen content), and then discharge of the water to open water. Due to the relatively small volume of discharge compared to site of the discharge, adverse impacts are expected to be minor, short-term, and of limited extent.

Construction Vessel Discharge. The operation of construction vessels during offshore pipeline and Port construction could result in adverse water quality impacts due to the discharges of water from construction vessels (e.g., deck drain runoff, engine cooling water, bilge water, treated sanitary wastewater, and potential oil spills).

Construction activities are expected to be of limited duration (11 months for Project construction, compared to the anticipated operating life of the Port of approximately 25 years), and discharges would be similar to those from other ships, boats, and barges in the Gulf and Tampa Bay. Construction vessels would not discharge sanitary waste (sewage) in state waters, where such discharge is prohibited. Sanitary waste could be discharged when vessels are in transit in international waters, in compliance with MARPOL.

Construction operations are likely to include the use of petroleum fuels, lubricating oils and greases, and cleaning solvents. These materials would be stored within small containers onboard the construction vessels and equipment. All construction operations that require the use of hazardous materials (e.g., heavy oil, diesel) would need to be in compliance with MARPOL Annex I and Annex IV and other applicable regulations set forth to minimize the risk of accidental discharge. All deck machinery would operate in compliance with an approved Spill Prevention, Control, and Countermeasures (SPCC) Plan. Decks on all vessels would be fitted with 4-inch-high welded steel barriers surrounding areas containing diesel-operated equipment. Although rainwater contaminated with petroleum products could potentially wash over the side of the ship deck, the potential for this to occur is expected to be low. Should such discharges occur, they would be expected to compose a relatively small volume and be readily dispersed in a short timeframe.

There is a potential for fuels or hazardous materials to be released, but any discharges are expected to be of very low volume and limited duration. Therefore, adverse impacts from construction vessel discharge would be expected to be minor and short-term.

With the use of BMPs proposed by the Applicant as presented in **Section 4.11**, adherence to all applicable laws, regulations, industry standards, and recommended mitigation measures, adverse impacts from construction vessel discharge would be minimized.

Onshore Groundwater. Onshore pipeline and interconnect station construction activities could result in adverse groundwater quality impacts due to the modification of the existing groundwater flow system, release of hazardous substances, or disturbance of existing contaminated groundwater.

Most segments of the pipeline would be installed by trenching and burial to a maximum depth of 4.7 m (15 feet). The onshore approach would be installed using HDD technology to a maximum depth of 37.5 m (120 feet) below water level, and one onshore segment through the FPL Tank Farm would be installed using HDD technology to a maximum depth of 12.5 m (40 feet). Because groundwater depth within the Surficial Aquifer System ranges from 0 to 3.1 m (0 to 10 feet) deep, the pipeline trench and the drilled borehole could be located below the water table, within the groundwater. For the trenched areas,

groundwater seeping into the trench would be pumped out, resulting in a short-term modification of the groundwater flow regime. Approximately 4 to 5 months are scheduled to install the entire 6.2-km (4-mi) pipeline. It is likely that any given trench location would only be open from a few hours to a few days, at the longest. Because the Surficial Aquifer is composed of loose soil and sand material, groundwater would flow back into open trenches within hours or days of pumping, and would have a minor adverse impact on the overall groundwater flow system.

The only aspect of the construction process that has the potential for adding contaminants to the groundwater is the potential release of fuels or lubricants from the operation of construction equipment. The Applicant has committed to following the FERC Procedures (see **Section 2.3.9**), which would ensure compliance with state and Federal permit conditions, including conditions related to the operation, and maintenance of equipment. The FERC Procedures require the Applicant develop an SPCC Plan, which would minimize the potential for, and adverse impacts of, any inadvertent releases of petroleum products or other hazardous materials into the environment during project construction. The SPCC Plan would specify preventive measures and clean-up and disposal procedures related to inadvertent fluid releases and would describe the preventative measures to be implemented to avoid spills. The SPCC Plan would also specify the spill response, clean-up, mitigation, reporting, and remediation measures to be implemented in the event of a spill. It would also specify spill response materials that must be available at the worksite, as well as required spill response training for the construction crew. Implementation of the SPCC Plan would minimize the project's potential short-term and long-term impact on groundwater resources.

Trenching and pumping of groundwater during construction of the onshore portion of the pipeline could potentially disturb areas with currently known groundwater contamination. The onshore pipeline route crosses within a few hundred feet to the south of the former Piney Point Phosphate gypsum stack system property, which is known to have been the location of a groundwater release and subsequent remediation effort. Groundwater flow in that area is reported to be to the north, away, from the pipeline route, so contamination is not likely to be present. To avoid disturbance of contaminated groundwater, the Applicant proposes to investigate groundwater in this area before performing trenching.

The pipeline route would include the use of HDD installation technology to install the pipeline at a depth of 13 m (43 feet) for a distance of 403 m (1,322 feet) below FPL tank farm. A review of FDEP environmental records did not identify any existing groundwater contamination issues or remediation efforts at this location. However, groundwater contamination is very common at petroleum product storage sites, and would not be unexpected at this location. Adverse impacts on groundwater or surface water quality could potentially occur if the HDD pathway intersected an area of contaminated groundwater.

Construction of the Gulfstream Interconnect Station and Port Manatee Valve Station would be performed by surface grading and placement of slab foundations. Slab foundations would not require substantial excavation, and there are no reports of contaminated groundwater in the area. Therefore, the construction of the stations is unlikely to adversely impact groundwater quality.

Minor, short-term adverse impacts on groundwater quality would potentially occur during construction of the onshore portion of the pipeline. Modification of the groundwater flow system by trenching and pumping groundwater from the top few feet of the existing aquifer system is not expected to result in adverse impacts. Although there is a potential for fuels or hazardous materials to be released to groundwater, any discharges are expected to be of very low volume and limited duration. However, the potential for construction operations to encounter contaminated groundwater does exist. Excavation is expected to occur within a few hundred feet of the known groundwater contamination at the former Piney Point property. In addition, although a literature search has not identified any groundwater impacts at the

FPL tank farm, they would not be unexpected in this industrialized area. Should pipeline construction activities encounter contaminated groundwater, the impacts are expected to be minor and of limited duration. However, disturbance of a contaminated groundwater plume that is currently under control could result in its release to a larger area. If pipeline construction does encounter contaminated groundwater, the potential adverse impacts on onshore groundwater could be moderate or major and long-term.

The implementation of spill response and emergency response plans would limit the duration and severity of a release event, should it occur. With adherence to all BMPs proposed by the Applicant and stated in **Section 4.11**, and applicable laws and regulations, minor adverse impacts on onshore groundwater would be minimized, and the potential for greater adverse impacts would be reduced.

Onshore Surface Water. Onshore pipeline and interconnect station construction activities could result in adverse surface water quality impacts due to the release of HDD drilling materials into surface waterbodies, and the discharge of hydrostatic test water.

At the onshore approach, the pipeline corridor would cross nearshore waters of Tampa Bay, sensitive habitats (such as seagrasses), tidally influenced mangrove habitat, and a water management ditch. This segment is classified as a 303d Listed Water Segment ("direct runoff to bay") by FDEP. To avoid disturbance of this area, the pipeline would be installed in the subsurface using HDD drilling technology. Surface-based construction activities associated with this technology would occur at either end of the 1,153-m- (3,783-ft-) long boring, but no activities would take place on the surface within the nearshore waters, sensitive habitats, or mangrove habitats that are being crossed. The surface-based activities occurring at either end of the boring would involve the use of construction vessels and vehicles for the duration of the construction, presenting a small potential for releases of fuels during a limited construction period. However, the Applicant's construction plan states that the activity itself would only involve the use of bentonite-based drilling mud with nontoxic additives. It is possible that an inadvertent release of drilling fluid, called a frac-out, could occur during HDD activities. If a frac-out were to occur, short-term sediment transport and bottom disturbance would likely adversely impact water quality. The FERC Procedures (see **Section 2.3.9**) require the Applicant to develop an HDD Plan that includes a description of how a frac-out would be contained and cleaned up. The Applicant would file all HDD plans with the FERC staff prior to construction. The non-Federal agencies with jurisdiction over HDD in Tampa Bay include FDEP (habitat and submerged lands), FWC (habitat and species), Tampa Port Authority (habitat and submerged lands in Tampa Bay), and Tampa Bay Regional Planning Council. Although Tampa Bay Regional Planning Council does not have a permitting process, they are a commenting agency for all proposed land alterations within the Tampa Bay Region.

Former wetland W-4, the borrow pond, is now considered to be a waterbody and would be crossed as such according to the FERC Procedures.

The final phase of construction would include gauging and hydrostatic testing of the onshore portion of the pipeline using 1.2 million gallons of water obtained from local fire hydrants. The Manatee County Utilities Department provides up to 45 million gallons of water per day, so the removal of 1.2 million gallons is not expected to result in adverse impacts on the water supply system. The timing and permits associated with access to the water would be coordinated with the Manatee County Utilities Department. The water would have biocides and oxygen scavengers added. Following testing, the test water would be discharged at a rate of 415 gpm at the Interconnection Station. The water discharge would be performed under appropriate state permits that would be obtained prior to construction. The discharged water would be treated (if required) and discharged through hay bales or other similar means to comply with water quality requirements of the discharge permit.

Major long-term adverse impacts on surface water quality could potentially occur during construction of the onshore portion of the pipeline. The HDD drilling and discharge of hydrostatic test water could potentially release a relatively large volume of poor quality water into small surface waterbodies. Should such releases occur, the adverse impacts could be substantial and of long duration. However, the potential for such adverse impacts to occur is expected to be low. Therefore, although the potential for major long-term adverse impacts exists, the likely actual impacts on onshore surface waters during construction activities is expected to be minor and short-term.

Use of the HDD Plan, as well as a spill response plan, would limit the duration and severity of a release event, should it occur. Adherence to all BMPs proposed by the Applicant and stated in **Section 4.11**, and applicable laws and regulations, adverse impacts on onshore surface waters would further reduce the potential for adverse impacts during construction.

Wetlands. Onshore pipeline and interconnect station construction activities could result in adverse water quality impacts due to the disturbance of designated wetlands during the installation of the onshore portion of the pipeline.

The onshore portion of the pipeline corridor would cross 9 individual sections of wetlands, including open water, scrub-shrub, emergent, and forested wetlands totaling approximately 10.71 acres, see **Section 4.2.2.1** for acreage details. Wetlands could be directly and adversely impacted by the removal of vegetation, disturbance of surface water flow paths, or the release of contamination into wetland areas. Port Dolphin's permanent operation of the pipeline would prevent trees and some larger shrubs from reestablishing directly over or adjacent to the pipeline. This would not result in a net loss of wetlands, but rather a conversion of the 1.19 acres of forested wetlands to emergent or smaller shrub type.

Because the proposed pipeline corridor crosses known wetlands, the potential for such impacts is certain, and not theoretical. The impact would be direct, adverse, minor, and long-term within the 10.71 acres of the construction area.

BMPs for wetland impacts are standard practice in the construction industry, and regulated by state, local, and Federal agencies. With proper adherence to industry standard BMPs proposed by the Applicant and stated in **Section 4.11**, and applicable laws and regulations, the adverse impact of construction of the onshore pipeline on wetlands would be reduced. Construction within wetlands would be conducted in accordance with the FERC Procedures and Port Dolphin's project-specific Wetlands and Waterbody Construction and Mitigation Procedures Plan, which contain wetland mitigation measures that are designed to minimize the overall area of wetland disturbance, minimize the duration of wetland disturbance, reduce the amount of wetland soil disturbance, and enhance wetland restoration following construction. The following are examples of some of the wetland impact minimization measures that Port Dolphin would adhere to:

- Limiting the operation of construction equipment within wetlands to only that equipment essential for clearing, excavation, pipe installation, backfilling, and restoration
- Using proper sediment and spoil controls
- Minimizing the time the trench is open in wetlands
- Installing trench breakers at the boundaries of wetlands as needed to prevent draining of a wetland and to maintain original wetland hydrology
- Prohibiting storage of hazardous materials, chemicals, fuels, and lubricating oils within a wetland or within 100 feet of a wetland boundary

- Restricting annual maintenance of vegetation to a 10-foot-wide strip of grasses centered over the pipeline and trees less than 15 feet in height within 15 feet of the pipeline centerline, and complying with state and Federal permit conditions.

The FERC Procedures requires that most wetlands be crossed using a right-of-way width of no greater than 75 feet. Port Dolphin has proposed to use a 100-foot-wide right-of-way in several wetlands. This issue is discussed in **Section 4.2.2.1.1**. With proper adherance to the FERC Procedures and other industry standard BMPs, as shown in **Section 4.11**, and applicable laws and regulations, the adverse impact of the onshore pipeline on wetlands would be reduced.

4.1.1.2 Operations

SRV Discharges. The SRV operations at the Port location could result in adverse water quality impacts due to the precipitation/deck runoff, discharge of engine and condensate cooling water, and discharge of firewater. **Table 4.1-1** presents the discharges associated with the operation of the SRVs as documented in the Applicant's NPDES permit application.

Table 4.1-1. Discharges Associated with the Pipeline Construction and Operation of the SRVs

Outfall Number	Operations Contributing Flow	Average Flow	Treatment
001	SRV 1 – Engine Room Cooling Water	6,604 gpm	Ocean discharge through outfall
002	SRV 1 – Firewater	5,238 gpm	Discharge to surface
001A	SRV 2 – Engine Room Cooling Water	6,604 gpm	Ocean discharge through outfall
002A	SRV-2–Firewater	5,238 gpm	Discharge to surface

Source: Port Dolphin 2007a

Notes: gpm – gallons per minute; MGD – million gallons per day

Uncontaminated precipitation/deck runoff would be discharged to the receiving waters through outlets on each side of the SRV. All deck areas where diesel or oil spills might occur would be confined by a 4-inch-high welded steel containment barrier. Potentially contaminated rainwater from these areas would be collected in a bilge holding tank, which would be equipped with an oil sensor. If oil concentrations greater than 15 ppm are detected, the bilge would be transferred to the engine room bilge system for treatment so that there would be no discharge that causes sheen on the water surface. The discharge would contain small amounts of petroleum product, but at low concentrations. Rainwater contaminated with petroleum products would not be expected to wash over the side of the SRV deck. Although the discharges of petroleum products could potentially occur, they are expected to be infrequent and small in volume.

Firewater discharge would be intermittent, occurring four times per year during USCG-required tests. During the tests, no chemicals are added to the water system. The discharge would be conducted in compliance with the NPDES requirements for outfalls 002 and 002A, and no detectable adverse impacts on water quality are expected.

The SRVs would require an intake of 9.5 MGD for engine and condensate cooling water, and up to 9.5 MGD of engine cooling water and firewater could be discharged. The SRVs would have systems onboard that generate wastewater, including sewage/domestic wastewater, brine from freshwater generators, and sodium hypochlorite from an electrochemical chlorination biofouling system. In addition, each SRV would take on up to 2.3 MGD of water for ballast to offset the weight of the offloaded LNG.

While SRVs are moored at the Port, there would be no discharge of sewage, domestic waste (gray water), bilge water, or ballast water. For the domestic waste systems, the SRVs would have sufficient onboard storage capacity for all wastewater generated while the vessel is moored at the Port. In compliance with MARPOL requirements, the wastewater would be stored, treated, and discharged while in transit in international waters. For the freshwater generator and biofouling systems, the systems would not need to be operated during the short time period that the vessel is moored at the Port, so no discharges would be generated at the Port location.

The purpose of the cooling water intake would be to reduce the temperature of engine systems and the LNG vaporization system. Therefore, the cooling water discharged would have an elevated temperature relative to the ambient temperature of the seawater. To evaluate any potential adverse impacts from the discharge of this heated water, Cornell Mixing Zone Expert System (CORMIX) modeling was conducted to predict the extent of elevated temperatures resulting from the discharge. CORMIX was selected because it is a USEPA-approved modeling software package for predicting the dispersion and mixing of effluent into surface waters. These include applications involving thermal gradients between the receiving water body and the discharge. The water quality criteria for the temperature increase is the USEPA 1986 standard allowing a maximum increase in the weekly average temperature of 1 °C. As shown in **Figure 4.1-1**, the water temperature drops rapidly as a function of distance from the discharge location. The modeling indicated that the discharge would produce exceedances of the standard over a maximum radius of 11 m (36 feet), and would produce detectable temperature increases over a maximum radius of 106 m (348 m). This impact would be minor due to the limited distance of impact, but would be adverse, direct, and long-term.

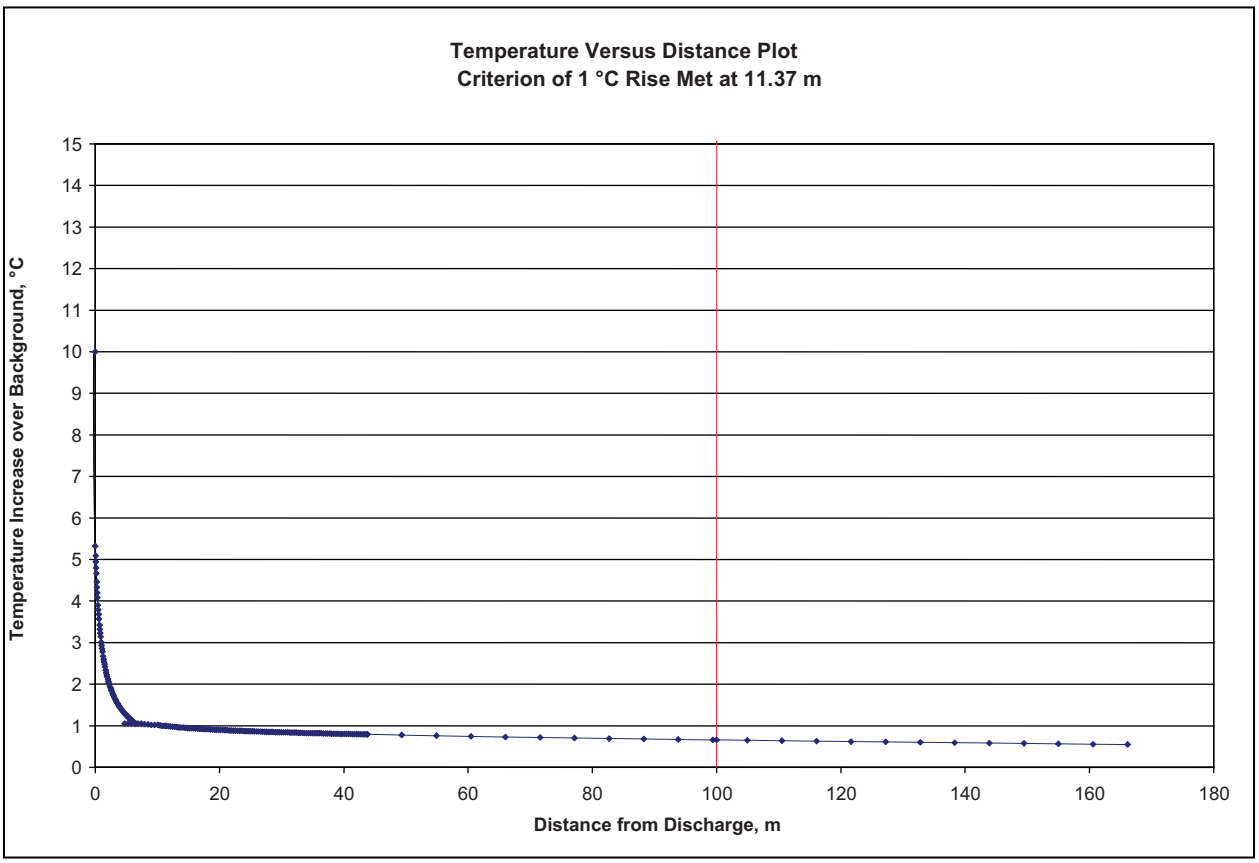


Figure 4.1-1. Temperature Distribution for Worst-Case (winter) Discharge Scenario

Also, there would be a potential for spillage of LNG during operations of the Port. However, LNG is not toxic and evaporates quickly; thus, impacts on water quality due to a release of LNG would be short-term, minor, direct, and adverse.

The result of the analysis is that minor direct adverse impacts on water quality could occur during the operation of SRVs at the Port. The potential for adverse impacts due to the release of rainwater, fuels, or hazardous materials is expected to be low, and any discharges are expected to be of very low volume and limited duration. However, the discharge of cooling water would be certain, as it is a necessary function of the SRVs. The impact of the cooling water discharge would be minor, adverse, direct, and long-term, but would occur over a limited distance from the Port.

SRV Mooring. The mooring of SRVs at the Port location could result in adverse water quality impacts due to sediment displacement when the flexible riser is pulled off the bottom as the buoy is raised to mate with the SRV. While the SRVs are moored at the Port, raising and lowering of the buoy and weathervaning of the SRVs would cause dragging of the mooring chains and risers on the seafloor. This would result in localized and temporary disturbances to the sediment, potentially causing short-term sediment resuspension and increases in turbidity near the bottom of the water column. These disturbances would occur periodically during the entire duration of the project (25 years).

The Applicant performed sediment suspension modeling for mooring line sweep, which would occur routinely during operations. The model was used to estimate the duration of elevated sediment concentrations resulting from the disturbance of the seafloor by the mooring lines. The model concluded that, under worst-case conditions, the sediment concentration would drop below 20 mg/L after 5 minutes of a sweep event. The suspended sediment would only rise to a height of 5 m (16 feet) above the seafloor, and result in deposition less than 2 mm (0.08 in) thick (ASA 2008). The magnitude and duration of these adverse impacts is small and temporary.

The result of the analysis is that minor, direct, adverse impacts on water quality would be expected during the mooring of SRVs. The amount of sediment resuspension anticipated during each event is small and short-term, but the event would be repeated every time an SRV arrives or leaves the Port throughout the 25-year duration of the project.

Offshore Pipeline Operation. Normal flow of gas through the offshore pipeline would not have any potential to cause adverse water quality impacts. Pipeline operations would only result in adverse water quality impacts due to pipeline rupture, and subsequent repair efforts.

According to the Applicant, operation of the offshore portion of the pipeline would consist only of the transmission of natural gas from the Port to Port Manatee. Therefore, it is not anticipated that contaminants would be released to the water column or sediment during operation of the pipelines. Should a leak or break occur in the pipeline or flowline, safety devices would shut down gas flow and isolate the problem. The natural gas would bubble to the surface and disperse. There would be a repair and response effort involving construction vessels and disturbance of sediment that could cause localized, short-term adverse impacts similar to those resulting from the initial construction activity.

Adverse water quality impacts could only occur in the event of a pipeline rupture. Should this occur, adverse impacts associated with pipeline repair would be similar to those associated with pipeline construction, but in a limited area and for a much shorter duration. The implementation of spill response and emergency response plans would limit the duration and severity of a release event, should it occur.

Onshore Pipeline and Interconnect Station Operation. Normal flow of gas through the onshore pipeline would not have any potential to cause adverse water quality impacts. Pipeline operations could result in

adverse water quality impacts due to pipeline rupture, and subsequent repair efforts. In addition, the position of the pipeline in the subsurface could potentially affect current surface water or groundwater flow paths.

No adverse impacts on groundwater quality, surface water quality, or wetlands would be expected during operation of the pipeline. Operation of the onshore portion of the pipeline would consist only of the transmission of natural gas from Port Manatee to the Gulfstream Interconnection Station. It is not anticipated that contaminants would be released to groundwater, surface water, or wetlands during operation of the pipeline. Should a leak or break occur in the pipeline, safety devices would shut down gas flow and isolate the problem. The natural gas would rise and disperse in the atmosphere. Repair activities are typically localized and short-term.

The location and size of the pipeline in the subsurface is not such that groundwater flow paths would be disturbed. The thickness of the Surficial Aquifer System is reported to be up to 6.3 m (21 feet) deep. The position of the 1-m- (3-foot-) diameter pipeline within the 6.3-m- (21-foot-) thick aquifer is not expected to impede groundwater flow.

The number of wetlands along the proposed pipeline route has been reduced from 11 to 9 due to development in the area, unrelated to this Project, and a refined definition of jurisdictional wetlands. It is important to note that Wetland W-5 was recently disturbed and filled (as of May 13, 2008). No portion of this wetland remains in the Project area. Additionally, the FPL borrow pond was originally delineated as Wetland W-4, but according to both the state and Federal rules, a borrow pond constructed in upland habitat is not jurisdictional. Pipeline corridor maintenance activities such as mowing and weed control could potentially impact wetlands and surface waterbodies if performed in a manner that caused runoff or damaged wetland biota.

Potential adverse water quality impacts could only occur in the event of a pipeline rupture and repair. Potential impacts would include soil disturbance and construction-related factors from replacing the pipe. In the event of a pipeline rupture on land, the impacts associated with pipeline repair would be similar to those associated with pipeline construction, but in a limited area and for a much shorter duration.

4.1.1.3 Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Offshore Decommissioning: The decommissioning of the offshore portion of the pipeline and the Port could result in adverse water quality impacts due to the operation of construction vessels.

The SRVs would be decommissioned by transporting them to suitable facilities for removal of LNG equipment. The buoys, risers, umbilicals, landing pad, and mooring lines would be removed. The pile anchors would be cut, with the top portion removed and the lower portion remaining in place. The pipelines would be decommissioned in place by filling them with seawater and capping the ends. Because there would be no disturbance of the seafloor through pipeline trenching or anchoring of construction vessels, adverse water quality impacts associated with sediment suspension would be expected to be much less than adverse impacts on water quality during construction and installation activities.

The result of the analysis is that short-term, minor, direct, adverse impacts on water quality could be expected during decommissioning of the Project. These adverse impacts would only occur through the operation of construction vessels during the decommissioning process. Therefore, the adverse impacts would be similar to those that would occur during construction, but would be of more limited duration.

The implementation of spill response and emergency response plans would limit the duration and severity of a release event, should it occur.

Onshore Decommissioning: The decommissioning of the onshore portion of the pipeline could result in adverse groundwater or surface water quality impacts due to excavation and disturbance within surface water, wetlands, and groundwater, or through the release of fuels or hazardous materials associated with construction equipment.

Short-term, minor, direct, and adverse impacts on surface water and groundwater quality would be expected during decommissioning of the onshore portion of the pipeline. Decommissioning would occur at the end of the Project duration (25 years), would be a one-time event, and would be subject to specific FERC review and approval for pipeline abandonment. The portions of the pipeline that were buried in trenches shallower than 2 m (6.4 feet) would be excavated, cut into sections, and removed, and the trenches would be backfilled and revegetated. The pipeline sections that were installed at depths between 2 m (6.4 feet) and 4.7 m (15.4 feet) using HDD technology would be abandoned in place by filling them with cement and capping the ends. The adverse water quality impacts associated with pipeline excavation and removal would be expected to be similar to the impacts associated with construction and installation of those sections. However, the sections that were installed by HDD would be left in place, so the decommissioning process for these sections would have a lower potential for adverse impacts than during construction and installation activities. Decommissioning would also involve excavation and use of construction vehicles in the same wetland areas that were affected during the initial construction. Adverse impacts associated with these efforts would be no larger than those associated with the initial construction.

The only aspect of the construction process that has the potential for adding contaminants to the surface water or groundwater is the potential release of fuels or lubricants from the operation of construction equipment. The Applicant has committed to following the FERC Procedures (see **Section 2.3.9**), which would ensure compliance with state and Federal permit conditions, including conditions related to the operation, and maintenance of equipment. The FERC Procedures require the Applicant develop an SPCC Plan, which would minimize the potential for, and adverse impacts of, any inadvertent releases of petroleum products or other hazardous materials into the environment during project construction.

The result of the analysis is that short-term, minor, direct, adverse impacts on water quality could be expected during decommissioning of the onshore portion of the pipeline. These adverse impacts would

include temporary disturbance of groundwater and wetlands during pipeline excavation. Adverse impacts could also occur through the operation of construction equipment during the decommissioning process. Therefore, the adverse impacts would be similar to those that would occur during construction, but would be of more limited duration.

4.1.2 Alternatives

Table 4.1-2 compares impacts from the Proposed Action to each of the alternatives with respect to water quality.

4.1.2.1 Southern Site and Route Alternative

The location of the Southern Site and Route Alternative is presented in **Figure 2.3-1**. The nearshore portions of the alternative routes are the same, so they would have the same construction, operation, and decommissioning impacts over this portion of the pipeline route. The alternative and proposed Port location and pipeline route are different only for the offshore portion. At 80.4 km (50 mi), the alternative pipeline route is approximately the same length as the Proposed Route, and therefore the total area impacted would be the same. The construction time and methods, and the associated potential for discharges associated with construction, operations, and decommissioning would be the same for the alternative and proposed locations and routes.

The only potential difference in adverse water quality impacts between the alternative and proposed locations and routes would be a different sediment characteristic, which could result in greater or lesser degrees of sediment suspension for the alternative route and location. No site-specific grain size study or sediment suspension modeling has been performed for this alternative route. However, regional grain size and sediment composition information for the two locations and routes was obtained from a review of several sediment sampling transects published by the USGS (Locker et al. 1999a, Locker et al. 1999b). These transects show that the general trend in sediment grain size and composition from the shoreline to locations offshore of both the alternative and proposed Port locations is very similar. Therefore, the magnitude and duration of water quality impacts resulting from sediment suspension is expected to be similar for both the proposed and alternative locations.

4.1.2.2 Offshore Interconnection with Gulfstream Pipeline Alternative

The location of the Offshore Interconnect Alternative is presented in **Figure 2.3-1**. The Port location, construction, and operation, and the associated water quality impacts, would be the same as those associated with the proposed Project. There would be three major differences that would affect the water quality analysis discussed for the proposed Project in **Section 4.1.1**. These are the shorter offshore pipeline route associated with the offshore Interconnect Alternative, the construction of the Interconnect Station at an offshore location, and the elimination of the entire onshore portion of the pipeline.

The shorter pipeline route (28.8 km for this alternative versus 67.6 km for the proposed Project) would result in a lower amount of construction-related impacts due to sediment disturbance and potential releases from construction vessels. The magnitude of the impacts would be the same as those for the proposed Project, but they would occur over a shorter distance and shorter time duration. The impacts would be in a different location, as the 28.8-km section of the pipeline route is not the same as any portion of the proposed Project. However, based on a review of the sediment sampling transects published by the USGS (Locker et al. 1999a, Locker et al. 1999b), there are not likely to be any substantial differences in sediment grain size or composition through this different area. The mitigation measures discussed for the proposed Project would also be used for this alternative.

The construction of the Offshore Interconnect would likely result in adverse water quality impacts due to sediment disturbance during offshore construction. Information on the construction of the Offshore Interconnect is currently unavailable. However, it is expected that these impacts would be of short duration.

This alternative would eliminate any need for the onshore portion of the pipeline. Therefore, none of the actual or potential adverse water quality impacts associated with the onshore portion of the proposed Project would occur should this alternative be selected.

4.1.2.3 FSRU Port Design Alternative

The FSRU unit itself would require one set of anchors, as opposed to two sets of anchors for the SRVs included in the proposed Project. Also, use of the FSRU would not require a flexible riser to be pulled off the bottom as the buoy is raised to mate with the SRV. These features would result in lower water quality impacts associated with sediment disturbance from mooring line sweep and raising and lowering of the buoy.

4.1.2.4 AAV Vaporization Technology Alternative

The FSRU design alternative would allow for the use of AAV technology to vaporize the LNG. By using air as the heating mechanism, this alternative would not generate cooling water to reduce the temperature of the LNG vaporization system, as would occur for the proposed Project. The AAV system would generate fresh water through condensation, and this fresh water would be discharged to the surrounding Gulf at a reduced temperature compared to ambient temperature conditions.

To evaluate any potential adverse impacts from the discharge of this water, CORMIX modeling was conducted to predict the extent of reduced temperatures resulting from the discharge. There are no common established water quality criteria for cooled discharges. The Draft NPDES Permit Application (Port Dolphin 2007a) used a combination of the USEPA marine aquatic life water quality criteria of maximum acceptable temperature increase of 1 °C (USEPA 1986) and the mixing zone size of 100 m (328 feet) based on the World Bank's definition for the thermal power plant discharges away from sensitive aquatic ecosystems. These same values are used in this analysis for comparison purposes. The parameters assumed in this analysis were a discharge volume of 1.2 MGD, at a temperature of 0 °C, and released directly on the surface. The ambient conditions used in the analysis included the most conservative, worst-case assumptions for ambient water temperature (30 °C during the month of August), wind speed (2.26 m/s), and water current speed (25.36 cm/s).

The results of the calculation are presented in **Figures 4.1-2** and **4.1-3.** Because the discharge water is fresh water, it does not mix readily with the more dense GOM water, and instead forms a thin layer on the surface. The modeling indicated that the temperature of this discharge would exceed the 1 °C temperature differential over a maximum distance of approximately 500 m (1,640 feet) from the FSRU. This distance is likely to be an overestimate, because the CORMIX model does not account for warming of the water by the overlying atmosphere. Therefore, the actual distance of reduced temperature would be less than 500 m (1,640 feet). Also, the temperature differential would be confined to a thin surface layer. This impact would be minor due to the limited thickness of impact, but would be adverse, direct, and long-term.

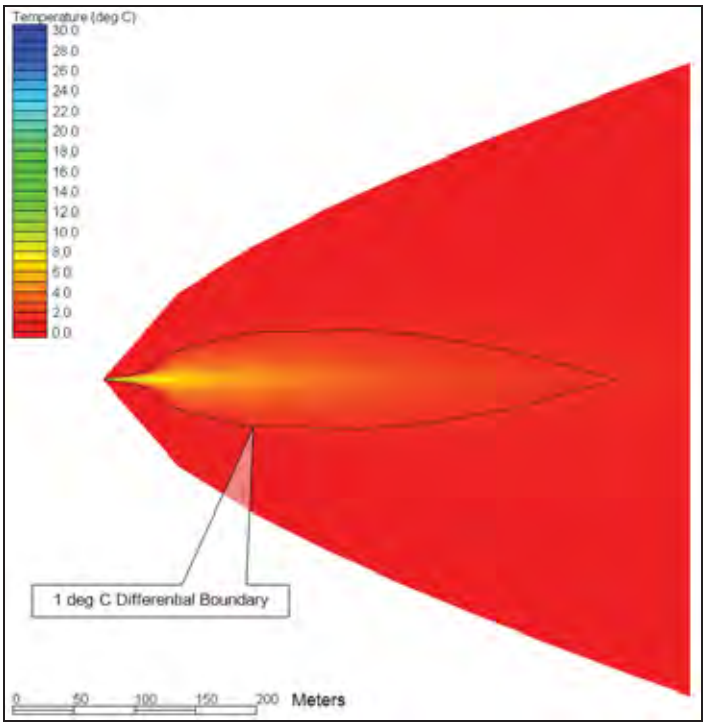


Figure 4.1-2. Plan View of the CORMIX Model Results

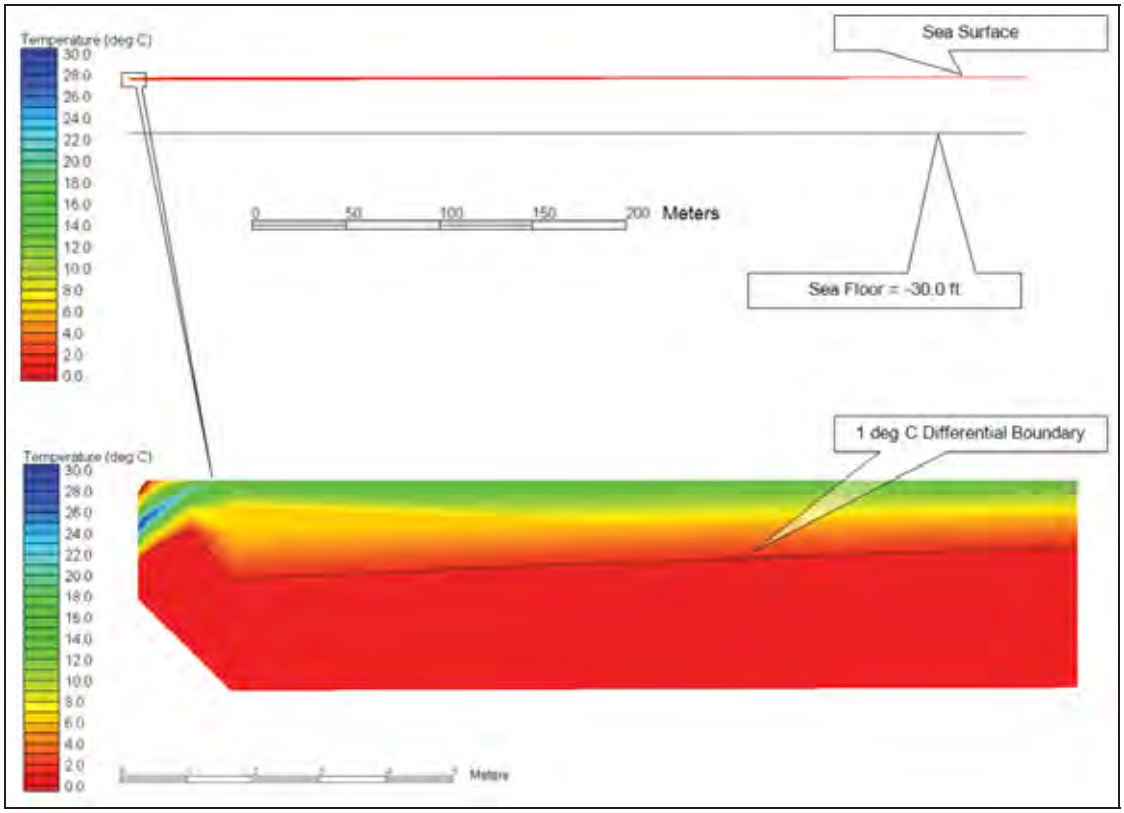


Figure 4.1-3. Cross-sectional View of the CORMIX Model Results

4.1.2.5 Suction Piles Anchoring Alternative

Construction, operation, and decommissioning impacts on water quality would be similar to those under the Proposed Action.

4.1.2.6 No Action Alternative

The No Action Alternative refers to the continuation of existing conditions of the affected environment, without implementation of the Project. Under this alternative, the additional infrastructure proposed by the Applicant would not be built and there would be no potential for adverse water quality impacts associated with Project construction and operation. Adverse impacts that could occur as part of the Project, and that would not occur as part of the No Action Alternative, include the following:

- Suspension of sediment at the Port location during construction, operations (mooring line sweep), and decommissioning
- Suspension of sediment along the offshore pipeline route during construction, and possibly as a result of repairs during operations
- Discharge of hydrostatic test water
- Potential releases of fuels and hazardous materials from construction, operation, and decommissioning vessels to offshore surface water
- Potential releases of fuels and hazardous materials from construction, operation, and decommissioning equipment and vehicles to onshore surface water or groundwater
- Disturbance of groundwater flow paths or state of contamination due to pipeline burial (construction), pipeline removal (decommissioning), or foundation excavation
- Disturbance of wetlands
- Modification of seawater temperature through SRV operations
- Current onshore and offshore water quality impacts associated with industrial operations, shipping, and the urban character of the Tampa Bay area would continue.

Table 4.1-2. Impact Summary for Water Quality for Each Alternative

Impacts	Proposed Project	Southern Site and Route Alternative	Offshore Interconnect Alternative	FSRU Port Design Alternative	AAV Vaporization Technology Alternative
Proposed Port Location	Construction impacts possible	Magnitude of impacts same as proposed Project, but in different location	Magnitude and location of impacts at Port location same as proposed Project; Additional impacts would occur at Interconnect location	Magnitude and location of impacts same as proposed Project	Magnitude and location of impacts same as proposed Project
Proposed Offshore Pipeline Route	Construction impacts possible along 67.6 km	Impacts possible along 80.4 km	Impacts possible along 28.8 km	Magnitude and location of impacts same as proposed Project	Magnitude and location of impacts same as proposed Project
Offshore Discharge of Hydrostatic Test Water	Discharge volume (and therefore impacts) related to pipeline length of 67.6 km	Increased volume (and therefore impacts) related to pipeline length of 80.4 km	Decreased volume (and therefore impacts) related to pipeline length of 28.8 km	Magnitude and location of impacts same as proposed Project	Magnitude and location of impacts same as proposed Project
Construction Vessel Discharge	Construction impacts possible along 67.6 km	Impacts possible along 80.4 km	Impacts possible along 28.8 km	Magnitude and location of impacts same as proposed Project	Magnitude and location of impacts same as proposed Project
Onshore Groundwater	Construction impacts possible	Magnitude and location of impacts same as proposed Project	No impacts	Magnitude and location of impacts same as proposed Project	Magnitude and location of impacts same as proposed Project
Onshore Surface Water	Construction impacts possible	Magnitude and location of impacts same as proposed Project	No impacts	Magnitude and location of impacts same as proposed Project	Magnitude and location of impacts same as proposed Project
Disturbance of wetlands	Construction impacts possible	Magnitude and location of impacts same as proposed Project	No impacts	Magnitude and location of impacts same as proposed Project	Magnitude and location of impacts same as proposed Project

Impacts	Proposed Project	Southern Site and Route Alternative	Offshore Interconnect Alternative	FSRU Port Design Alternative	AAV Vaporization Technology Alternative
Port Operations Water Discharges	Cooling water discharge impacts	Magnitude of impacts same as proposed Project, but in different location	Magnitude and location of impacts same as proposed Project	Magnitude and location of impacts higher due to LNGC discharges	Magnitude of cooling water discharge lower due to use of AAV condensation for engine cooling
Vessel Mooring	Sediment disturbance impacts	Magnitude of impacts same as proposed Project, but in different location	Magnitude and location of impacts same as proposed Project	Magnitude and location of impacts same as proposed Project	Magnitude of impacts lower because there would be only one mooring system instead of two
Offshore Pipeline Operation	Potential impacts associated with repairs along pipeline length of 67.6 km	Potential impacts associated with repairs along pipeline length of 80.4 km	Potential impacts associated with repairs along pipeline length of 28.8 km	Magnitude and location of potential impacts same as proposed Project	Magnitude and location of potential impacts same as proposed Project
Onshore Pipeline Operation	Potential impacts associated with repairs; Possible modification of groundwater flow	Magnitude and location of impacts same as proposed Project	No impacts	Magnitude and location of impacts same as proposed Project	Magnitude and location of potential impacts same as proposed Project
Offshore Decommissioning	Impacts similar to, but lesser than, construction	Magnitude of impacts same as proposed Project, but in different location	Magnitude and location of impacts at Port location same as proposed Project; Additional impacts would occur at Interconnect location	Magnitude and location of impacts same as proposed Project	Magnitude and location of potential impacts same as proposed Project
Onshore Decommissioning	Impacts similar to, but lesser than, construction	Magnitude and location of impacts same as proposed Project	No impacts	Magnitude and location of impacts same as proposed Project	Magnitude and location of potential impacts same as proposed Project

Notes:

There would be no impacts from the No Action Alternative.

The Suction Pile Anchoring Alternative was carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.2 Biological Resources

The following section on biological resources differs from other resource areas by providing an organizational structure intended to facilitate review of the broad range of marine and terrestrial resources that fall under the general category of biological resources. In this section, possible impacts are discussed by specific resource groups. These groups are marine protected areas, threatened and endangered species, marine mammals, sea turtles, coastal and marine birds, fish and invertebrates, benthic resources, EFH, and terrestrial resources. Each resource group then includes a discussion of construction, operations, and decommissioning impacts for the Proposed Site and Route Alternative. Finally, impacts of other alternatives are discussed.

Included in the discussion are elements of the project description that would both produce impacts and are proposed to minimize potential impacts. Applicant-proposed measures for minimizing potential environmental impacts are those that have been committed to by the Applicant and incorporated into the project design, and are listed in **Section 4.11**. If further measures are recommended by lead or cooperating agencies to mitigate potential adverse impacts, they are stated at the end of each analysis and in **Section 4.11**.

4.2.1 Coastal and Marine Resources

4.2.1.1 Marine Protected Areas

4.2.1.1.1 Proposed Action

Within the Tampa Bay estuary, there are four APs: Boca Ciega Bay, Cockroach Bay, Pinellas County, and Terra Ceia. The project is not near or expected to have any impact on Boca Ciega Bay, Cockroach Bay, or Pinellas County APs.

The pipeline route would be about 530 m (1,740 feet) from the northern edge of the Terra Ceia AP. Near the approach to Port Manatee along the northeastern edge of the AP, the minimum distance would be 37 m (121 feet). Impacts on the Terra Ceia AP would occur only during construction. There would be no activities in the Terra Ceia AP during routine operations or decommissioning.

Near the mouth of Tampa Bay, the pipeline would pass between two NWRs (see **Figure 3.2-1**). The Proposed Route is approximately 800 m (2,625 feet) from Passage Key NWR and 1,750 m (5,742 feet) from Egmont Key NWR.

Construction

Seafloor Disturbance and Turbidity. The Proposed Route would avoid disturbing sediments within the Terra Ceia AP. No plowing, dredging, or anchoring would occur within the AP. In the shore approach area near Port Manatee where the pipeline is closest to the AP, a jack-up barge would be used that has legs that rest directly on the seafloor, so there would be no anchors extending into the AP. Therefore, seafloor disturbance impacts would be negligible.

For most of its length the pipeline would be buried using a plowing technique. Both the trenching per se and anchoring of the lay barge would be sources of turbidity. The impacts of sediment suspension were modeled by the Applicant using the SSFATE model (ASA 2008). This modeling was performed to estimate the suspended sediment concentration, and the transport and deposition of sediment, resulting from pipeline construction and operation. The adverse impacts from three separate construction activities were evaluated in the model: the releases of HDD drilling fluid, the use of a clam shell dredge to excavate

the exit hole for the HDD locations, and the use of a mechanical plow or hydraulic jet to install pipeline sections. The model was used to estimate the area in which sediment concentrations would continue to exceed 100 mg/L after 30 minutes. The total areal extent of the turbidity plumes created during pipeline installation would be approximately 1,894 hectares (4,679 acres) (ASA 2008). The turbidity plumes would be short-lived and remain fairly close to their source. However, the duration of the exceedance was predicted to be limited to less than 2 hours for the worst-case condition. In addition, although sediment deposition of up to 15 mm (0.6 in) was predicted locally, the majority of the affected area would receive less than 2 to 3 mm of sediment (ASA 2008). The magnitude and duration of these adverse impacts is small and temporary.

Modeling performed for the installation of the Gulfstream pipeline through this same area of Tampa Bay was also reviewed. For the Gulfstream project, the Final EIS (FERC 2001b) developed by the FERC concluded that disturbance of sediment would result in exceedances of the Florida state water quality standard of 29 nephelometric turbidity units (NTUs) for turbidity over a relatively small area, and for a short period of time. The model predicted that the area exceeding the turbidity standard at any given time would cover an area of 0.9 acres. Also, the model predicted that the longest length of time any given location would be exposed to an exceedance of the turbidity standard would be 10 hours. Therefore, the FERC concluded that the overall impact from pipeline construction would be minimal (FERC 2001b).

Extending this conclusion to the current Port Dolphin Project would require that the location, construction method, and construction duration for both projects is approximately the same. Based on a review of the Gulfstream EIS, it appears likely that the Port Dolphin pipeline route would have smaller adverse impacts than those evaluated for the Gulfstream pipeline. This is because the Gulfstream pipeline was constructed directly through a 5.9-km (4-mi) portion of the Terra Ceia AP Tampa Bay, while the Proposed Route Alternative for the Port Dolphin pipeline does not enter the preserve (Port Dolphin 2007c).

Based upon this analysis, direct adverse impacts on water quality would be expected during the construction of the offshore portion of the pipeline. The impacts would result from the disturbance of seafloor sediment during construction. Contraventions of the FDEP requirements for OFW or toxic pollutants, and other water quality parameters are not anticipated during construction of the pipelines.

Plumes from construction activities are not expected to result in turbidity or sedimentation in areas of manatee critical habitat. The nearest designated critical habitat areas for manatees are (1) the Manatee River, which is approximately 5 km (3.1 mi) from the nearest point on the pipeline route; and (2) the Little Manatee River, which is approximately 13 km (8.1 mi) away. Based on the turbidity modeling (ASA 2008), the plume would not be expected to reach these areas (Port Dolphin 2008a).

Due to the short-term duration of the construction activities, and the minimal amount of sediment resuspension anticipated, short-term, minor, adverse impacts on water quality within MPAs during installation of the pipelines would be expected.

Vessel Traffic. Adverse impacts on water quality within MPAs would be expected from discharges of water from construction vessels (e.g., deck drain runoff, engine cooling water, bilge water, treated sanitary wastewater). These discharges would be of limited duration (less than 6 months for Project construction), and would be similar to those from other ships, boats, and barges in the Gulf and Tampa Bay. Construction vessels would not discharge sanitary waste (sewage) in locations where such discharge is prohibited.

The main potential impact as the result of vessel traffic in coastal waters during construction would be disturbance to two NWRs, which are important bird areas. Vessel traffic transiting near Egmont Key could result in disturbance of foraging and reproductive activity of wintering piping plovers. Availability

of quality foraging and roosting habitat in the wintering grounds is necessary to ensure that an adequate number of adults survive to migrate back to breeding sites and successfully nest. Interrupted feedings can stress juvenile birds during critical periods in their development (USFWS 2007b).

Short-term, minor, direct and indirect, adverse impacts on MPAs would be expected from discharges of water from construction vessels and vessel traffic disturbance near MPAs.

Hydrostatic Test Water Intake and Discharges. During the construction phase, seawater would be used for hydrostatic testing of the pipeline and flowlines. To assist in leak detection during testing, a fluorescent dye (Champion Fluorescent Dye or similar) would be added to the filtered seawater at an average concentration of 450 ppm. Also, a benign corrosion inhibitor (HydroHib P) would be added to the water. The discharges would comply with NPDES permit requirements and would occur outside the Terra Ceia AP. Impacts on the Terra Ceia AP or any other AP would be considered short-term and minor.

Operations

No adverse impacts on MPAs are anticipated as a result of water quality degradation from normal Port operations. The project would not degrade marine water quality or cause irreparable harm to aquatic life or beneficial uses of the aquatic ecosystem. No Federal or state water quality criteria or water discharge criteria would be violated. All operational discharges would be conducted in compliance with the NPDES requirements, and no detectable impacts on water quality are expected.

There would be a potential for spillage of hydrocarbons and LNG during operations of the Port. All SRVs are designed with features to minimize the potential for oil spills, the impact is expected to be minor and short-term (see **Section 2.3.3**). LNG is not toxic and evaporates quickly and the closest MPA to the Port is approximately 40 km (25 mi), which exceeds the potential reach of an LNG spill; thus, no impacts on MPAs due to a release of LNG are expected.

Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Therefore, impacts on MPAs are expected to be reduced, although a specific timeline would be developed at the time of decommissioning and abandonment.

Impacts on MPAs associated with the decommissioning of the project are expected to be similar, but of less magnitude, than impacts on water quality during construction and installation activities. Short-term, minor, direct, and adverse impacts on MPAs would be expected during decommissioning of the project.

4.2.1.1.2 Alternatives

Table 4.2-1 compares impacts from the Proposed Action to each of the alternatives with respect to MPAs.

Southern Site and Route Alternative. Under this alternative, impacts on MPAs would be substantially greater than the Proposed Action. The pipeline would run adjacent to and within the boundaries of the Terra Ceia AP. Impacts on the Terra Ceia AP would occur only during construction, as there would be no activities in Terra Ceia during routine operations or decommissioning. As proposed, the Southern alternative route enters the Terra Ceia AP from the northwest and traverse primarily soft-bottom and some hard- and live-bottom communities for 4.8 (3.0 mi). The pipeline exits the preserve, and traverses another 5.8 km (3.6 mi) along the northern boundary before re-entering the preserve at the northeastern corner for 1 km (0.6 mi). Short-term, moderate, direct, and adverse impacts on MPAs would be expected under this alternative.

Offshore Interconnection with Gulfstream Pipeline Alternative. Impacts on MPAs would be less than the Proposed Action under this alternative. Under this alternative the pipeline would not come onshore because of the connection to the Gulfstream pipeline. Therefore, no direct or indirect impacts on the Terra Ceia AP or critical habitat for wintering piping plovers would be expected. Seafloor disturbance associated with pipeline disturbance under this alternative would be less in shallow coastal waters and would not occur in Tampa Bay. A more detailed description of seafloor disturbance under this alternative is described in detail under Benthic Resources. There would also be less of an impact of turbidity in shallow coastal waters associated with pipeline installation under this alternative. There would be no turbidity increases associated with pipeline installation in Tampa Bay under this alternative.

FSRU Port Design Alternatives. Construction, operation, and decommissioning impacts on MPAs under the FSRU Port Design Alternative would be similar to but to a lesser degree than those under the Proposed Action. The FSRU unit itself would require one set of anchors, as opposed to two sets of anchors for the SRVs included in the proposed Project. Also, use of the FSRU would not require a flexible riser to be pulled off the bottom as the buoy is raised to mate with the SRV. These features would result in decreased turbidity associated mooring line sweep and raising and lowering of the buoy.

AAV Vaporization Alternative. Construction, operation, and decommissioning impacts on MPAs under the AAV Vaporization Alternative would be similar to those under the Proposed Action.

Suction Piles Anchoring Alternative. Construction, operation, and decommissioning impacts on MPAs under the Suction Piles Anchoring Alternative would be similar to those under the Proposed Action.

No Action Alternative. The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, no direct or indirect impacts on MPAs would be expected.

Table 4.2-1. Marine Protected Area Impacts Summary

Impact	Proposed Action	Southern Site and Route Alternative	Offshore Interconnect Alternative	FSRU Design Alternative
Pipeline construction	Minor, short-term, adverse impacts along pipeline route as a result of seafloor disturbance, turbidity, vessel traffic, and hydrostatic testing, and discharge.	Moderate, short-term, adverse impacts along the pipeline corridor as the result of seafloor disturbance, turbidity, vessel traffic, and noise (route within Terra Ceia AP and near 2 NWRs); long-term impacts as the result of seafloor disturbance.	No impacts. No MPAs offshore.	No difference from Proposed Action.
Port construction	Minor, short-term, adverse impacts in vicinity of the Port as a result of seafloor disturbance, turbidity, and vessel traffic.	No difference from Proposed Action.	No impacts. No MPAs offshore.	No difference from Proposed Action.
Operation of Port	Minor, long-term, adverse impacts due to potential LNG/hydrocarbon spills.	No difference from Proposed Action.	No impacts. No MPAs offshore.	No difference from Proposed Action.
Decommission of Port	Minor, short-term and long-term, adverse impacts in vicinity of the Port are similar to but lower than port construction impacts.	No difference from Proposed Action.	No impacts. No MPAs offshore.	No difference from Proposed Action.

Notes:

1. Under the No Action Alternative none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur. No direct or indirect impacts on biological resources would be anticipated.
2. The AAV and Suction Pile Anchoring Alternatives were carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.2.1.2 Threatened and Endangered Marine Mammals

4.2.1.2.1 Proposed Action

As discussed in **Section 3.2.4**, the Maritime Administration has the responsibility under the ESA to determine whether or not the Project would adversely affect threatened or endangered marine mammals and their critical habitat. In accordance with Section 7 of the ESA, the Maritime Administration and the USCG initiated informal consultation with the USFWS and NMFS on August 24, 2007. Minimization measures to reduce potentially adverse impacts on protected marine mammals are described in **Section 4.11**. ESA-listed marine mammals with documented occurrence in the northern GOM are listed in **Table 4.2-2**. Of these species, only the West Indian manatee regularly occurs in the Port Dolphin Action Area. The sperm whale, while common in the GOM, only occurs seaward of the shelf break (200 m [656 foot] isobath) (Jochens et al. 2008); this species is not expected to be impacted by the Proposed Action. The humpback whale and North Atlantic right whale (herein referred to as right whale) are sporadically sighted in the northern GOM, including along the west coast of Florida; the sei whale, blue whale, and fin whale could be considered extralimital (beyond their normal range) (Würsig et al. 2000). The West Indian manatee is the only marine mammal species with designated critical habitat in the northern GOM (see **Section 3.2.3.4** for more details).

Table 4.2-2. ESA-Listed Marine Mammal Species with Documented Occurrence in the Northern GOM

Common Name	Scientific Name	ESA status
West Indian manatee	*Trichechus manatus*	Endangered, critical habitat (in GOM)
North Atlantic right whale	*Eubalaena glacialis*	Endangered, critical habitat (not in GOM)
Humpback whale	*Megaptera novaeangliae*	Endangered
Fin whale	*Balaenoptera physalus*	Endangered
Sei whale	*Balaenoptera borealis*	Endangered
Blue whale	*Balaenoptera musculus*	Endangered
Sperm whale	*Physeter macrocephalus*	Endangered

Construction

Seafloor Disturbance. Installation of Port components and pipelines would temporarily disrupt benthic habitat in the immediate vicinity of the construction areas. ESA-listed marine mammals could be indirectly impacted if prey species (including aquatic vegetation) were displaced or destroyed by construction activities. The pipeline route would not pass through any manatee protection areas including critical habitat or manatee protection zones. The proposed pipeline's route would be constructed within a half of a mile of the Terra Ceia AP, about 7 km (4.5 mi) from manatee critical habitat and about 11.5 NM from a manatee protection area In the nearshore areas, seagrass was observed predominantly near Manbirtee Key, the spoil island near Port Manatee, and in water with a bottom depth shallower than 2 m (7 feet) (Port Dolphin 2007b). The nearest seagrasses are 23 m (75 feet) to the southwest and distances greater than 59 m (194 feet) to the northeast of the HDD exit point; therefore seagrasses would be avoided. Neither manatees nor their feeding areas would be directly impacted by seafloor disturbance due to mitigation measures. Threatened and endangered baleen whales are only sporadically sighted in the GOM and have not been observed to feed here (feeding grounds for both the humpback whale and right whale are off the northeastern United States); therefore, no impacts on these species are anticipated.

Short-term, minor, indirect, adverse impacts on threatened and endangered marine mammals could occur as a result of seafloor disturbance caused during construction.

Turbidity. The main source of water quality impacts would be pipeline trenching, which would produce turbidity along the pipeline route. Sources of turbidity include pipeline burial, as well as anchoring of the lay barge, placement of the pipeline and mattresses, and HDD of the shore approach. The clamshell dredge method to be used during the Proposed Action is expected to produce much less turbidity than jetting (ASA 2008). As indicated in **Section 4.1.1**, turbidity modeling (SSFATE) conducted by the Applicant was used to estimate the area in which sediment concentrations would continue to exceed 100 mg/L after 30 minutes. Under worst-case conditions, it is estimated that sediment concentration would exceed 100 mg/L for less than 2 hours (ASA 2008). Turbidity modeling indicates that both turbidity plumes would be short-lived and remain fairly close to their source (ASA 2008). The total areal extent of the turbidity plumes created during pipeline installation is estimated to be approximately 1,894 hectares (4,679 acres) (ASA 2008). However, the actual distance from the source would depend on the source (e.g., HDD, dredge) and prevailing conditions (e.g., weather and tide). Water turbidity appears to have little or no direct impact on manatees or threatened and endangered whales, as they are sighted in both clear and muddy waters (Hartman 1979). However, suspended sediments in the water column reduce light availability and, therefore, seagrass production (SCDNR 1995); seagrass beds serve as feeding areas for manatees. Manatees and threatened and endangered whales could be indirectly impacted as a result of any hazardous substances in sediment being resuspended and bioaccumulated in food items from contaminated suspended sediments. Due to the temporary nature of water quality changes following construction activities, short-term, minor, indirect, adverse impacts on manatees or threatened or endangered whales could occur.

Hydrostatic Test Water Intake and Discharges. During the construction phase, seawater would be used for hydrostatic testing of the offshore pipeline and flowlines. The seawater would be taken onboard a marine vessel at five locations along the route. Hydrostatic testing is a one-time temporary event that would require filling the pipeline twice. To assist in leak detection during testing, an environmentally benign dye, Hydro Tag Green Fluorescent Dye, would be added to the flooding and test water. HydroHib P would be added as a corrosion inhibitor; it is widely used in the offshore pipeline industry and has been approved by the USEPA and certified by USEPA-approved laboratories. HydroHib P requires no neutralization and the treated water can be discharged into the sea (subsea) through specially designed diffusers. This is intended to release the treated seawater into a larger volume of water than if diffusers were not used. As the test water is released to the sea, the concentration would be immediately diluted well below the toxicity limit via the diffusers, thereby further rendering the test water as uninhibited or "Non-Toxic." The hydrostatic test water discharge would occur offshore from a marine vessel at one of the STL buoy locations rather than at Port Manatee. No water quality impacts are expected from the water additives.

Manatees feed primarily on aquatic vegetation, so no indirect impacts are expected to this species. There is no evidence of feeding by humpback or right whales during their rare occurrences in the GOM; feeding grounds are off the northeastern United States for these two species, so no impacts would be expected on these species either.

Vessel Traffic. Construction activities, associated with the Proposed Action, would result in increased vessel traffic in the Tampa Bay region. As specified by the Applicant, approximately 1,800 total vessel trips would be required during construction, as shown in **Table 4.10-1** (Port Dolphin 2008a). **Section 4.10.1** provides more information on construction vessel traffic. Twelve types of vessels might be used during construction (weather contingent); the supply vessel (360 to 600 total trips) and material barges (720 to 900 total trips) represent the most frequent vessel movements. Frequency of vessel movements ranges from 2 trips per year for jack-up and dragline barges to approximately 900 trips per

year for material barges. Expected vessel traffic during construction would consist of approximately 1,796 trips over the 11-month construction period. Approximately 125,000 boats were registered in Manatee, Hillsborough, and Pinellas counties in 2006, of which approximately 2,800 are considered commercial and include charter vessels and commercial fishing vessels (HSMV 2005). From a broader perspective, upwards of 1,000 commercial vessels pass through the Straits of Florida daily, and there are tens of thousands of vessel transits annually in the GOM. The worldwide commercial fleet was estimated to include at least 81,867 vessels in 1999 and is reportedly increasing at about 12 percent per year (NRC 2003). Vessel traffic can affect marine mammals by direct collisions with vessels, wave action from boat wakes impacting seagrasses, noise (which might cause behavioral disturbance), and accidental hydrocarbon spills. Potential impacts of noise from vessel traffic are discussed in the following section addressing *noise*. Increased vessel traffic is likely to increase inadvertent discharge of petroleum hydrocarbons into the water; those possible impacts are discussed in the marine mammal sections regarding *hydrocarbon spills*.

The largest problem presently faced by manatees in Florida is death or injury from boat strikes (USFWS 2001). Vessel collisions (particularly from small watercraft) are identified as a major source of mortality for Florida manatees (*Trichechus manatus latirostris*), where more than 30 percent of all documented deaths have been attributed to vessel strikes (Nowacek et al. 2004). Deaths from boat strikes involve all age classes and occur year-round over much of the manatee's range in the GOM (Nowacek et al. 2004). A large percentage of adult manatee carcasses bear scars from previous boat strikes and the healed, skeletal fractures of some indicate that they had survived previous traumatic impacts.

Many living manatees have been scarred by boat collisions, especially on the tail and back. Nonlethal injuries can reduce the breeding success of wounded females and could permanently remove some animals from the breeding population. Vessel traffic that disturbs manatees can cause them to leave preferred habitats and could alter biologically important behaviors such as feeding, nursing, or resting (FWC 2006).

To help reduce the chance of vessel strikes, the State of Florida has established manatee protection zones, including those in the Tampa Bay area. Two types of manatee protection areas also have been developed by USFWS: manatee sanctuaries and manatee refuges. Manatee sanctuaries are areas in which all waterborne activities are prohibited, and manatee refuges are areas where certain waterborne activities are restricted or prohibited (designation of refuges or sanctuaries, however, would not eliminate waterway property owner access rights). To date, USFWS has established seven winter sanctuaries to protect manatees in association with the Crystal River NWR. The most recent was a 0.25-acre sanctuary established in 1997 at Three Sisters Spring run (FWC 2006). The pipeline route where construction activities would occur does not pass through any manatee protection zones (approximate closest distance from pipeline route to manatee protection areas is 11.5 NM).

Injuries and deaths resulting from ship collisions also represent a significant threat to several large whale populations (Laist et al. 2001, Jensen and Silber 2003). In general, whales engaged in feeding and other activities tend to be less responsive to approaching ships. All types and sizes of vessels hit whales, but most lethal and serious injuries are caused by larger vessels. Laist et al. (2001) report that of 15 whales considered severely injured by ship strikes, 3 were struck by vessels less than 20 m (65.6 feet) long, 3 were struck by vessels 20 to 80 m (65.6 to 262.5 feet) long, and 9 were struck by vessels longer than 80 m (262.5 feet). Of the 23 whales killed by vessel collisions, at least 20 whales (87 percent) were struck by vessels more than 80 m (262.5 feet) long (Laist et al. 2001).

Vessel speed is a principal factor in the severity of injury or likelihood of mortality among whales struck by ships (Jensen and Silber 2003). Vessel speed at the time of strike was reported for 58 of the 292 strikes recorded in NOAA's Large Whale Ship Strike Database (Jensen and Silber 2003). The range of

speeds at which vessels were operating when a whale was hit was 2 to 51 knots, with a mean speed of 18.1 knots. This category for the Proposed Action would include SRVs, which typically travel at speeds up to 19.5 knots in the open ocean. However, once approaching the vicinity of the terminal, SRVs would slow to about half-speed. The mean vessel speed which resulted in injury or mortality to the whale was 18.6 knots. The majority (79 percent) of these strikes occurred at speeds of 13 knots or greater. Of the 58 cases, 19 (32.8 percent) resulted in serious injury to the whale and 20 (34.5 percent) resulted in death. In total, 39 (67.2 percent) ship strikes in which ship speed was known resulted in serious injury or death (Jensen and Silber 2003). In a more recent study by Pace and Silber (2005) which evaluated 64 ship strike records in which vessel speed was known, there was strong evidence that the probability of death or serious injury increased rapidly with increasing speed. The predicted probability of death or serious injury increased from 45 percent to 75 percent as vessel speed increased from 10 to 14 knots, and exceeded 90 percent at 17 knots. Speeds of 25 knots and greater resulted in a 100 percent probability of death or serious injury. A reduction in speed from 18 knots to 12 knots would give whales an additional 2.6 seconds (at a distance of 50 m (164 feet)) to avoid a vessel.

Increases in vessel traffic (with no mitigation or monitoring) could potentially increase the likelihood for collisions with ESA-listed marine mammals, thereby increasing the occurrence of serious injuries or mortality. While it is known that an increase in vessel traffic increases the risk of collision, the probability of that risk cannot be quantified. Short-term, minor, direct, and adverse impacts on threatened and endangered marine mammals could occur as a result of increased vessel traffic during construction (without mitigation and monitoring). Any vessel strike of a threatened and endangered marine mammal would be considered a “take” under both the MMPA and ESA. Based on NMFS recommendations, the Applicant has proposed BMPs for all vessels used during installation routine operations, and decommissioning to reduce or avoid impacts of vessel traffic on marine mammals. With strict adherence to the proposed BMPs, adverse impacts on marine mammals would be reduced.

Additional indirect effects from increased vessel traffic include increased wave action due to vessel wakes and scarring of seagrass beds by propellers (EPC 2007). Seagrasses are important foraging areas for the manatee. Wakes affect seagrass beds by the increase of wave action which might play a role in the decline of longshore sandbars that help protect seagrasses (Lewis 2002), as well as increased turbidity that, as noted earlier, reduces light availability and, therefore, seagrass production. Turbidity modeling indicates that turbidity plumes would be short-lived (settle to close to background levels within 5 hours) and remain fairly close to their source (ASA 2008). It also indicates that sediment resuspended by plowing would not reach seagrass beds near the landfall. However, resuspended sediment from HDD pit excavation would reach seagrass beds south of the HDD pit. The seagrass beds would be exposed to suspended sediment levels of 0 to 5 mg/L and the total area of seagrasses affected would be 0.78 hectares (1.93 acres). However, no measurable sediment accumulation on seagrasses is predicted (Port Dolphin 2008). As stated above, seagrass beds are dynamic, and a thorough seagrass survey would be conducted prior to construction to determine the current status and location of seagrass in the area of HDD exit location (Port Dolphin 2007b). Seagrasses would be avoided and mitigated based on the BMPs and the Project-specific Wetland and Waterbody Construction and Mitigation Procedures Plan. The plan would be developed in coordination with appropriate regulatory agencies and implemented prior to and during construction activities. The specific recovery plan would address a preconstruction seagrass survey, consistent with NMFS recommendations and mitigating unavoidable impacts on wetlands and waters of the United States (inland, coastal, and seagrasses).

Due to the temporary nature of water quality changes during construction, short-term, minor, direct, adverse impacts on manatees, and indirect impacts on their feeding grounds (i.e., seagrasses and macroalgae) would not be expected when taking mitigation measures into consideration. No impact on right whales or humpback whales is expected since these two species are only sporadically sighted in the

GOM and have not been observed to feed here (feeding grounds for right whales and humpback whales are off the northeastern United States).

Noise. Marine mammals rely heavily on the use of underwater sounds to communicate and gain information about their environment. Even in the absence of man-made sounds, the sea is noisy and ambient background noise can interfere with the ability of marine mammals to detect sound signals even when they are above its absolute hearing threshold. Ambient background noise includes natural contributions from wind, waves, precipitation, and other animals, as well as sounds from distant human activities such as shipping or oil exploration and production (Richardson et al. 1995). Ambient noise is highly variable over continental shelves, and this inevitably results in a high degree of variability in the range at which marine mammals can detect man-made sounds.

Known effects of noise on marine mammals have been reviewed by various sources (Richardson et al. 1995, Hildebrand 2005, NRC 2005, Nowacek et al. 2007, Weilgart 2007a, Weilgart 2007b). Human-made sounds can affect the ability of marine mammals to communicate and to receive information about their environment. Such noise can interfere with or mask the sounds used and produced by these animals and thereby interfere with their natural behavior.

Observed effects of noise on marine mammals include changes in vocalizations; respiration, swim speed, diving, and foraging behavior; displacement; avoidance; shifts in migration path; stress; hearing damage; and strandings. The response threshold depends on whether habituation (gradual waning of behavioral responsiveness) or sensitization (increased behavioral responsiveness) occurs (Richardson et al. 1995); however, as noted by Wright et al. (2007) an interpretation of a reduction in behavioral responses to noise as acclimation might be a mistake in many situations, as alternative reasons for the observed results are much more likely. Sounds can cause reactions that might include disruption of marine mammals' normal activities (behavioral or social disruption) and, in some cases, short- or long-term displacement from areas important for feeding and reproduction (Richardson et al. 1995). Marine mammal responses to noise vary widely depending on the species, the context and duration of exposure, the properties of the stimuli (e.g., low-frequency versus high-frequency, continuous versus pulsive), the time of day or year, the reproductive state of the animal, the activity of the animal at the time of exposure, and the experience or prior exposure of the animal (NRC 2003, Richardson et al. 1995). Responses also vary widely among individuals of a species or group.

Disturbance is one of the main concerns of the potential impacts of man-made noise on marine mammals, but for many species and situations, there is no detailed information about reactions to noise. Behavioral reactions of marine mammals to sound are difficult to predict because they are dependent on a variety of factors. Preliminary research suggests that most small- and medium-sized toothed whales are unlikely to be displaced when exposed to prolonged or repeated underwater sound unless the overall received sound level exceeds 140 dB re 1μPa at 1m. Baleen whales are probably more sensitive to low-frequency sounds and have been shown to react to sound levels of 120 dB re 1μPa at 1m. Toothed whales also appear to exhibit a greater variety of reactions to man-made sound than baleen whales. While toothed whale reactions vary from approaching the vessel to strong avoidance, baleen whale reactions range from neutral to strong avoidance (Richardson et al. 1995).

The energetic consequences of one or more disturbance-induced periods of interrupted feeding or rapid swimming, or both, have not been evaluated quantitatively. Energetic consequences would depend on whether suitable food is readily available. Of the animals responding to noise, females in late pregnancy or lactating would probably be most affected. Human-made noise can cause temporary or permanent hearing impairment in marine mammals if the noise is strong enough. Such impairment would have the potential to diminish the individual's chance for survival.

Determining if short-term changes in behavior represent a biologically significant effect is difficult (Wright 2006). Immediate or short-term changes in behavior could represent short- or long-term effects on a population. Short-term changes in behavior can include many of the changes described in previous literature including increases in dive duration and changes in direction of travel. However, long-term impacts or effects include changes such as reduced health and viability of a population. For example, short-term changes in activity budgets that reduce amount of time feeding could represent long-term challenges by reducing energy acquisition. These short-term changes could also have a greater impact on a population depending on resource availability.

Nonauditory physical effects can also occur in marine mammals exposed to very strong underwater sound. Possible types of nonauditory physiological effects or injuries that, in theory, might occur include stress, neurological effects, bubble formation, resonance effects, and other types of organ or tissue damage.

The potential impacts of noise on marine mammals can be based on specific zones of influence (ZOIs): (1) the zone of audibility (within which the animal can hear the sound), (2) the zone of responsiveness (within which the animal reacts to the sound), (3) a zone of masking (within which the noise levels can interfere with other sounds and signals), and (4) the zone of hearing loss or discomfort (within which the animal's physical auditory structures are temporarily or permanently damaged). ZOI refers to the distances at which marine mammals are affected by man-made noise. Marine mammals usually do not respond overtly to audible but weak man-made sounds, so the zone of "responsiveness" is usually much smaller than the zone of audibility. Potential effects of noise on marine mammals include masking, behavioral disturbance, hearing impairment in the form of permanent or temporary threshold shifts (PTS and TTS, respectively), and nonauditory physiological effects (Richardson et al. 1995). Noise can also elicit behavioral responses such as cessation of feeding, resting, or social interaction; onset of alertness or avoidance; or attraction to the noise source. Behavioral responses vary widely both within and among species, and many marine mammals habituate easily to underwater noise (Watkins 1986). Alternatively, noise can be detectable but have no effect on an animal's behavior, hearing, or physiology.

Noise Criteria. Very high sound levels can rupture the eardrum or damage the small bones in the middle ear. Continuous sound exposure and loud sounds can temporarily or permanently affect the auditory sensitivity of animals by causing an upward shift in auditory threshold; such an effect is called a sound-induced threshold shift, or simply a threshold shift. A threshold shift can be either permanent, in which case it is termed a PTS, or it may be temporary, in which case it is termed a TTS. Still lower levels of sound can result in auditory masking, which could interfere with an animal's ability to hear other concurrent sounds.

<u>Injury (Level A Harassment)</u>. Nonlethal injurious impact is defined as eardrum rupture (i.e., tympanic-membrane [TM] rupture). This is considered indicative of the onset of injury. This recognizes that TM rupture is not necessarily a life-threatening injury, but is a useful index of possible injury that is well correlated with measures of permanent hearing impairment. This is often referred to as PTS.

The primary factors thought to cause a PTS are sound impulse duration, peak amplitude, and rise time. However, no data are available on noise levels that might induce PTS in marine mammals. Damage to a marine mammal's hearing apparatus could theoretically occur if an animal is exposed to sound impulses that have very high peak pressures, especially if they have very short rise times. Also, very prolonged exposure to a noise strong enough to elicit a TTS, or shorter-term exposure to noise levels well above the TTS level, could cause hearing impairment in marine mammals. For sound exposure at or somewhat above the TTS level, hearing sensitivity presumably recovers rapidly after exposure to the noise ends, and the received sound level from a single noise exposure must be far above the TTS level for there to be any risk of PTS. It has been suggested that PTSs caused by prolonged exposure to continuous man-made

noise is not likely to occur in marine mammals for sounds with source levels less than 200 dB re 1μPa at 1m (Richardson et al. 1995).

Level A harassment has an exposure criterion of 180 dB re 1 μPa^2-s.

TTS and Sub-TTS (Level B Harassment). There are two thresholds for noninjurious harassment, also known as Level B harassment. The first is TTS, which is a temporary, recoverable, loss of hearing sensitivity that is considered to result from the temporary, noninjurious distortion of hearing-related tissues. The duration of the TTS varies depending on the nature of the stimulus, but by definition, there is generally recovery of full hearing over time (Hastings and Popper 2005). A TTS is the mildest form of hearing impairment and occurs when exposure to a strong sound results in a nonpermanent elevation in hearing threshold making it harder for an animal to hear sounds. TTS can last from minutes or hours to days and the magnitude of the TTS depends upon other factors, including the level and duration of noise exposure. For sound exposures at or somewhat above the TTS level, hearing sensitivity usually recovers rapidly after exposure to the noise ends (Richardson et al. 1995). Only a few data on sound levels and durations necessary to elicit mild TTSs have been obtained for marine mammals. Although TTS studies on humans and terrestrial mammals provide insight on understanding the principles of TTS, it is unclear to what extent these data can be extrapolated to marine mammals (LGL and JASCO 2005).

The second threshold is termed "sub-TTS" and is used to account for behavioral disturbance large enough to be judged as harassment, but occurring at lower sound energy levels than those that might cause TTS.

Behavioral modification has been defined to address a noise level or other activities that might potentially cause marine mammals to alter normal biological behavior. NMFS defines these behavior responses as modifications resulting from repeated noise exposures (below TTS) to the same animals (i.e., resident) over a relatively short period of time (Southall et al. 2007).

Behavioral disturbance criteria for impulse/intermittent sounds is set at a sound pressure level (SPL) value of 160 dB re 1 μPa at 1m and 120 dB re 1 μPa at 1m for continuous noise (70 FR 18871–1875).

The exposure zone for Level B harassment includes both behavioral effects and physiological effects and includes the region in which TTS is predicted to occur.

Noise Types. NMFS recognizes three general kinds of sounds: continuous (e.g., shipping sounds), intermittent (e.g., vibratory pile-driving sounds), and impulsive (e.g., conventional pile driving) (NMFS 2008a). Noise sources associated with construction activities of the Proposed Action include pipe laying, pipe burial, vessel traffic, and anchor installation. It should be noted that sounds from moving sources might be continuous, but for an animal at a given location, these sounds would be a transient impact on the animal, as the vessel passes by. Hearing capabilities of threatened and endangered marine mammals are described in **Section 3.2.4.1**. Baleen whales and the West Indian manatee are considered to be most sensitive to low-frequency sounds (about 7 Hz to 22 kHz), while odontocetes have relatively good hearing across a broader range of mid- to high-frequency sounds (150 Hz to 160 kHz to 100 kHz) (Southall et al. 2007). Manatees are considered to hear predominantly low-frequency sounds (Gerstein et al. 1999). Therefore, all ESA-listed marine mammal species assessed for the Proposed Action are low-frequency hearing specialists (e.g., manatee, right whale, and humpback whale).

The hammer to be used for pile driving would be similar to the Menck MHU 3000 hydraulic hammer (JASCO 2008). Impact hammering noise source levels that were used for noise modeling were based on the LGL Limited and JASCO Research Limited (2005) underwater noise modeling report developed for the Neptune Deepwater Port EIS and are based on measurements and computations based on Greene and Davis (1999) and Malme et al. (1998) (Port Dolphin 2009a). There are only rare occurrences of the

manatee, humpback whale, and right whale in the offshore component of the Project (STL buoy locations); therefore, potential impacts on listed marine mammal species from pile driving would be expected to be short-term minor adverse.

The noise from HDD operations, both onshore and offshore, is primarily from the diesel engines that power the drilling and pull-in winches. The HDD could take between 3 to 4 weeks each to accomplish, during which the equipment would be running most of the time. However, the in-air noise near the HDD drilling equipment is normally within 88 dB, which is a decibel level where ear protection is not required as defined by Occupational Safety and Health Administration (OSHA) rules and regulations. It is anticipated that the noise generated by both onshore and offshore HDD operations would be less than that caused by ongoing large bulk carrier ships that traverse the shipping lanes in the same area of the planned HDD. With strict adherence to the proposed BMPs, there would be a full-time manatee watch during construction of the pipeline and all operations would cease when a manatee is sighted in the vicinity of the HDD. It should also be noted that most of the noise generated by the HDD operations is above the surface of the water (either on land or on a fixed jack-up vessel) and therefore noise generated by HDD operations would have to travel down the legs of the jack-up into the water, which would quickly dissipate and would have a minimal effect on manatees.

Vessels contribute noise primarily through propeller cavitation, propeller singing, and propulsion or other machinery (Richardson et al. 1995). Characteristic ship noise is a combination of narrowband, tonal sounds, and broadband sounds with energy continuously over a wide range of frequencies (Richardson et al. 1995). Levels and frequencies of both tonal and broadband sounds tend to be related to vessel size; for example, large vessels create stronger and lower-frequency sounds (Richardson et al. 1995). For medium to large vessels, tones dominate up to about 50 Hz (Richardson et al. 1995). Broadband components can extend up to 100 kHz, peaking at 50 to 150 Hz (Richardson et al. 1995). Vessel noise (particularly from large ships) is a major contributor to low-frequency ambient noise in the ocean and is a major environmental concern (NRC 2003, 2005). During 2004, NOAA and a number of other government, industry, and academic partners convened the first formal meeting ("Shipping Noise and Marine Mammals: A Forum for Science, Management, and Technology") to consider the effects of sounds from large vessels on marine life. During 2007, NOAA convened a symposium to assess quieting applications for large commercial vessels.

Vessel traffic is considered to be continuous noise, and, as noted earlier in the discussion of acoustic criteria, subject to level A and B thresholds for continuous noise (180 dB and 120 dB, respectively). Continuous noise from vessels is a main sound source during construction. Listed species that could be exposed to construction vessel noise include the manatee (for the inshore portion of pipeline construction) and any rare occurrences of the humpback whale and right whale (at the STL buoy locations and anywhere along the pipeline route). However, the latter two species are expected to be rare in the Project area. Although sounds created by construction equipment and vessels would be continuous during pipeline installation, activities would progress slowly along the route as the pipeline is laid, buried, and the trench backfilled. Thus, any one area would be subject to the maximum sound levels for only a day or two each time as the construction activities pass that area. The following types of vessels are likely to be involved during the two types of installation:

- Buoy installation. A large crane vessel and a cargo barge. Depending on the chosen installation method, one or several assisting installation vessels might be required for the installation.
- Pipeline installation. An inshore pipelaying barge and two smaller anchor-handling support vessels. Pipeline burial would most likely be done using an advanced burial plow and backfill plow system. Each crossing of the Gulfstream Pipeline would require two jack-up barges in the 200-Class range.

The noise associated with construction would be broadband noise (over a wide range of frequencies, as described above) and most marine mammals present would be capable of hearing it. Third-octave bands (10 to 2,000 Hz) and source levels for construction scenarios for noise modeling are presented in **Section 4.8**. Underwater noise would travel in all directions from the source. **Tables 4.2-3** and **4.2-4** present results of the noise modeling in terms of radii to threshold values of 120 dB to 190 dB root mean square (RMS). Additional detail regarding the noise modeling is presented in **Section 4.8**. **Table 4.2-3** presents modeling results which show the distance from noise sources that Level A and Level B harassment of threatened and endangered marine mammals and other listed species could occur. **Table 4.2-4** presents the distance from noise sources that Level A and Level B harassment of threatened and endangered marine mammals and other listed species, could occur for inshore construction activities.

In order to take into account the differential hearing capabilities of various groups of marine mammals, the M-weighting frequency weighting approach described by Miller et al. (2005) was applied. The M-weighting filtering process is similar to the C-weighting method that is used for assessing impacts of loud impulsive sounds on humans. It accounts for sound frequencies extending above and below the most sensitive hearing range of marine mammals within each of five functional groups: low-frequency cetaceans, mid-frequency cetaceans, high-frequency cetaceans, pinnipeds in water, and pinnipeds in air (Southall 2007). The right whale and the humpback whale are low-frequency cetaceans, and, as noted earlier, are expected to rarely occur in the area of the Proposed Action. Measurements on captive manatees (Gerstein et al. 1999) indicate a functional hearing range of 400 Hz to 46 kHz, which is within the bounds listed for pinnipeds. As such, M-weightings for pinnipeds are used as a precautionary approximation of impact for manatees in **Table 4.2-4**. The Applicant has initiated preapplication consultations with the NMFS regarding incidental harassment authority (IHA) and Letter of Authorization (LOA) requirements. NMFS would determine whether an operational permit is required.

Based on the types of noise and the distances affected, monitoring measures would be taken to avoid both Level A and Level B harassment of marine mammals. Avoidance and monitoring measures are presented in **Section 4.11.** Overall, the amount of noise created during buoy installation, pipelaying, and pipe burial would be consistent with other man-made underwater noise sources in the area (e.g., commercial shipping or dredging,). Few data are available for the ambient noise levels in the areas associated with the Proposed Action. **Section 3.8.3** provides a discussion of the ambient noise levels associated with types of activities similar to the Proposed Action. Most noise would be short-term in duration and moderate in intensity, and few, if any, threatened and endangered marine mammal species are expected near the Port site where the strongest noise source during construction would occur. Therefore, it is anticipated that short-term, direct, adverse effects on marine mammals would be minor.

Continuous noise created by construction vessels could potentially mask sounds produced and received by marine mammals. Masking occurs when underwater noise interferes with an animal's ability to hear other concurrent sounds such as conspecifics, or predators. This could, in turn, affect an animal's ability to feed, mate, or travel efficiently and safely through an environment. While no data exist for the specific area associated with the Proposed Action, Phillips et al. (2006) found that ambient noise measurements near the mouth of the Crystal River, approximately 130 km (81 mi) north of the Proposed Action area, were 105 dB. While one cannot quantifiably analyze the noise levels specifically in the Proposed Action area, one can assume that the ambient noise levels would increase. However, based on acoustic analyses performed off the northeastern United States using similar equipment and construction techniques, the transient nature and short-term duration of construction vessel noise would reduce the potential for masking to occur (LGL and JASCO 2005). In general, marine mammal exposure to construction vessel noise would only occur for a finite period of time and would not be expected to have long-term population-level impacts on marine mammals.

Table 4.2-3. Distance from Broadband Noise Sources that Level A and Level B Harassment of Threatened and Endangered Marine Mammals[1] and other Listed Species Could Occur for Offshore Construction Activities

	Buoy Installation (distance from source)	Pile Driving (distance from source)	Pipe Laying (distance from source)	Pipe Burial (distance from source)
Low-Frequency Hearing Cetaceans[2]				
Level A	1 to 20 m	3 to 18 m	< 20 m	< 20 m
Level B	20 m to 3.8 km	18 m to 4.5 km	20 m to 7.4 km	20 m to 8.3 km

Source: JASCO 2008

Notes:

1. The manatee is not expected in the offshore area.
2. The North Atlantic right whale and humpback whale are the only low-frequency hearing cetaceans anticipated in the area of the Proposed Action; these occurrences would be rare.

Level A harassment: intensities above 180 dB re 1 μPa at 1 m RMS

Level B harassment (impulse noises): intensities above 160 dB re 1 μPa at 1 m RMS

Level B harassment (continuous noises): intensities above 120 dB re 1 μPa at 1 m RMS

Table 4.2-4. Distance from Broadband Noise Sources that Level A and Level B Harassment of Threatened and Endangered Marine Mammals and other Listed Species Could Occur for Inshore Construction Activities.

	Pile Driving (distance from source)	Pipe Laying: Passage Key (distance from source)	Pipe Laying: Tampa Bay (distance from source)	Pipe Burial: Tampa Bay (distance from source)
Low-Frequency Hearing Cetaceans[1]				
Level A	7 to 30 m	< 20 m	< 20 m	< 20 m
Level B	30 m to 1.9 km	20 m to 1.6 km	20 to 6 km	20 to 6.7 km
Manatee				
Level A	6 m to 26 m	< 20 m	< 20 m	< 20 m
Level B	26 m to 1.8 km	20 m to 1.5 km	20 m to 6.0 km	20 m to 6.7 km

Source: JASCO 2008

Notes:

1. The North Atlantic right whale and humpback whale are the only low-frequency hearing cetaceans anticipated in the area of the Proposed Action; these occurrences would be rare.

Level A harassment: intensities above 180 dB re 1 μPa at 1 m RMS

Level B harassment (impulse noises): intensities above 160 dB re 1 μPa at 1 m RMS

Level B harassment (continuous noises): intensities above 120 dB re 1 μPa at 1 m RMS

Selected documented reactions of threatened and endangered marine mammals to continuous underwater noise created by industrial activities, such as drilling, are presented in **Table 4.2-5**. Mitigation measures to reduce the impacts of pile driving are described in **Section 4.11**.

Table 4.2-5. Selected Threatened and Endangered Marine Mammal Responses to Continuous Underwater Sound Sources Created by Various Industrial Activities

Mysticetes (Baleen Whales)	
Humpback whale	• Showed no obvious avoidance response to drill ship sounds with broadband received source levels of 116 dB re 1 μPa. • Exhibited startle responses to received sound level of 150 to 169 dB re 1 μPa, even at distances up to 3.2 km (2 mi) away. • Whale songs were not interrupted by dynamite blasts. • Commonly found within 10 km (6 mi) of blast sites and showed no obvious reactions to received sound levels of about 150 dB re 1 μPa.

Source: Unless otherwise stated, all information was adapted from Richardson et al. 1995.

The pipeline route does not pass through any manatee protection zones. Pile driving would occur approximately 7.6 km (4.8 mi) from the nearest manatee critical habitat and approximately 21.7 km (13.6 mi) from the nearest manatee protection zone. In addition, the project includes mitigation that would help reduce exposure of manatees to construction activities (see **Section 4.11**). Therefore, adverse impacts on manatees would be expected to be minor.

Vessel noise would be continuous, yet transient. Reactions of various marine mammals to transient underwater sound sources are summarized in **Table 4.2-6**. In general, baleen whale reactions to transient vessel noise include changes in swimming direction and speed, blow rate, and the frequency and kinds of vocalizations (Richardson et al. 1995). Baleen whales occasionally approach stationary or slow-moving boats, but they more commonly avoid them. Avoidance is strongest when boats approach directly or when vessel noise changes abruptly. Long-term reactions of baleen whales to vessel noise vary, but some species seem to show habitation to frequent boat traffic (Richardson et al. 1995). Short-term, minor, direct, adverse impacts on ESA-listed marine mammals could occur as a result of noise generated by construction vessels and machinery. With the application of BMPs and minimization measures, adverse impacts could be minimized.

Entanglement. It is possible that marine mammals might become entangled by anchors, anchor lines, or buoy lines deployed during construction. For example, as noted by NMFS (2007), entanglement in fishing vessel anchor lines has been documented historically; however, NMFS also notes that no information is available on the prevalence of such events. Short-term, minor, direct, adverse impacts on ESA-listed marine mammals could occur as a result of entanglement during construction. With strict adherence to proposed BMPs for detection of marine mammals in the area, the potential for entanglement associated with construction activities of the Proposed Action would be minimized.

Lighting. Construction activities would take place 24 hours per day, 7 days per week, during the installation period. For identification and safety purposes, construction and support vessels would be required to display lights when operating at night. The use of vessel lights during construction would be short-term, temporary, and transient. All lights would be installed and used in accordance with NMFS and USFWS guidelines designed to reduce impacts on marine mammals. Additionally, during installation an environmental coordinator would be on-site to ensure no violations would occur. This would decrease attraction by fish and invertebrates to the area, as well as marine mammals that might be attracted by their presence, thereby reducing the vulnerability of ESA-listed marine mammals to possible disorientation, vessel strikes, noise, predation, and entanglement. Long-term, minor, direct, adverse impacts on marine mammals would be expected to occur as a result of lighting used during routine Port operations. As a

Table 4.2-6. Selected Threatened and Endangered Marine Mammal Responses to Transient Underwater Sound Sources

Mysticetes (Baleen Whales)	
Humpback whale	• Responded negatively to boats at distances of at least 0.3 to 0.5 NM (Bauer 1986, Bauer and Herman 1986). • Showed little or no reaction to boats (Watkins 1986).
North Atlantic right whale	• Showed no response to actual vessels or to playbacks of the sound of a large (120-m [394-foot]) container ship approaching (Nowacek et al. 2003). • Slow-moving vessels can approach, but abrupt changes in course or engine noise elicit a negative reaction (Goodyear 1989, Mayo and Marx 1990, Gaskin 1991). • Mothers interposed themselves between calves and directly approaching vessels.
Sirenians	
West Indian manatee	• Oriented towards deeper channel waters and increased their swimming speed when boats were within approximately 25 to 50 m (82 feet to 164 feet) (Nowacek et al. 2004). • Show some avoidance of approaching boats, but the response is often too late and too slow to avoid collision.

Source: Unless state otherwise, all information adapted from Richardson et al. 1995.

result, direct and indirect, adverse impacts on ESA-listed marine mammals would be short-term and minor.

Marine Debris. Both entanglement in and ingestion of debris have caused the death of or serious injury to marine mammals (Laist 1997). The discharge and disposal of garbage and other solid debris from vessels by lessees is prohibited by the MMS (30 CFR 250.300) and the USCG (MARPOL Annex V, Public Law 100-220 [Statute 1458]) (33 CFR Part 151). The discharge of plastics, including ashes from burned plastics, is strictly prohibited and is therefore never authorized. All plastics must be returned to shore, and are tracked. These prohibitions on the discharge and disposal of garbage and other solid debris from vessels would be incorporated as enforceable conditions into the DWPA license. The USCG enforces MARPOL and the Deepwater Port License and fines or penalties could be assessed where laws and regulations are violated. Short-term, minor, direct, adverse impacts on marine mammals could occur if marine debris were accidentally released during the Proposed Action. Based on the measures that would be implemented to reduce the discharge of marine debris, it is unlikely that ESA-listed marine mammals would be adversely impacted by marine debris associated with the Proposed Action.

Operations

Seafloor Disturbance and Turbidity. Operations activities would cause long-term disturbances in both soft- and hard-bottom habitat. The placement of buoy system parts and concrete mattresses along the pipeline route, as well as anchor sweep would result in 16.32 acres of long-term disturbance on soft-bottom habitat and 19.42 acres of long-term disturbance on hard-bottom habitat. An additional 18.98 acres of soft substrate/sand habitat would be disturbed due to anchor sweep. It is anticipated that long-term STL buoy anchor chain sweep would cause the resuspension of fine sediments and would result in a sediment drape and turbidity increases within immediately adjacent areas. Turbidity associated with

long-term chain scour is expected to be localized and in the lower portion of the water column. This area would not be expected to recolonize because of long-term chain scour. Turbidity could spread from the immediate area of the proposed Port and affect different areas depending on the currents.

Removal of bottom habitat, along with resident benthic organisms within the area, affects not only the benthic communities, but also the fish assemblages that rely on the benthos for food, which in turn are preyed upon by marine mammals. Once the disturbance ceases, the substrate would be available for recruitment of benthic organisms. Reestablishment of a benthic community similar to that in adjacent areas would be expected to take a period of weeks to several years. Threatened and endangered baleen whales are only sporadically sighted in the GOM and have not been observed to feed here (feeding grounds for both the humpback whale and right whale are off the northeastern United States), so no impacts on these species would be anticipated. Additionally, manatees are expected to be rare in the offshore project area. Therefore, seafloor disturbance associated with Port operation is not expected to result in impacts associated on these species.

Water turbidity appears to have little or no direct impact on manatees or threatened and endangered whales, as they are sighted in both clear and muddy waters (Hartman 1979). Threatened and endangered baleen whales are only sporadically sighted in the GOM and have not been observed to feed here (feeding grounds for both the right whale and the humpback whale are off the northeastern United States). Additionally, manatees are expected to be rare in the offshore project area. Therefore, turbidity associated with Port operation is not expected to result in impacts on these species.

Vessel Traffic. A maximum of 90 SRVs could call on Port Dolphin per year. In the open ocean, SRVs typically travel at speeds of up to 19.5 knots. However, once approaching the vicinity of the terminal, SRVs would slow to about half-speed. Manatees, which occur inshore, would not be affected by SRV traffic. Supply and crew vessels are expected to call on the SRVs while at Port Dolphin. Based on the estimated 90 calls a year, 938 supply vessel trips from 22 onshore locations in Tampa Bay are anticipated.

Increases in vessel traffic (with no mitigation or monitoring) could potentially increase the likelihood for collisions with ESA-listed marine mammals, thereby increasing the occurrence of serious injuries or mortality. Additional indirect effects from increased vessel traffic include increased wave action due to vessel wakes and scarring of seagrass beds by propellers, noise from vessel traffic (potential impacts and analyses discussed in detail under *noise*), and accidental hydrocarbon spills (potential impacts and analyses discussed in detail under *hydrocarbon spills*).

While it is known that an increase in vessel traffic increases the risk of collision, the probability of that risk cannot be quantified. Short-term, minor, direct, and adverse impacts on threatened and endangered marine mammals could occur as a result of increased vessel traffic during operation (without mitigation and monitoring). Any vessel strike of a threatened and endangered marine mammal would be considered a "take" under both the MMPA and ESA. Based on NOAA and USFWS recommendations, the Applicant has proposed BMPs for all vessels used during installation routine operations, and decommissioning to reduce or avoid impacts of vessel traffic on marine mammals (see **Section 4.11**). Additionally, threatened and endangered baleen whales are only sporadically sighted in the GOM. Minor, long-term adverse impacts on manatees or threatened or endangered whales would be expected during operation. The use of proposed BMPs, minimization measures, and mitigation measures (see **Section 4.11**) would further reduce potential adverse impacts.

Noise. Long-term, minor, direct, adverse impacts on federally listed marine mammals could occur as a result of noise generated by SRVs and support vessels during routine Port operations. Background information on noise impacts on marine mammals and acoustic criteria can be found in **Section 4.2.1.2.1**, discussed in detail under *noise* in *construction impacts*.

Long-term underwater noise impacts would be created by the operation of various equipment and powering systems on the SRVs and other support vessels, as well as from the vaporization of the LNG at the mooring buoy. An overlap is anticipated between arriving and departing SRVs; consequently, an SRV would be present most of the time. Under the Proposed Action, the Port would operate 24 hours a day, 365 days per year to provide a continuous supply of natural gas.

The source levels associated with the regasification process are expected to be nearly 110 dB in the water, near the vessel. There are no situations where the noise level exceeds 120 dB even a few meters from the vessel (LGL 2008). Therefore, no effects on marine animals are expected from noise associated with regasification.

Noise levels in the offshore area would be elevated when two SRVs are on buoys at the same time (separated by a distance of approximately 5 km (3 mi)) (JASCO 2008). While SRVs are moored at the Port, main engines would not be operational, but shipboard machinery used to regasify or offload LNG, generate power, and maintain facilities, would produce continuous sources of noise. An additional noise source could include the sound produced by the flow of gas through the proposed flowline, although very little noise in the underwater environment would be expected (JASCO 2008).

The SRV traffic associated with the project would contribute incrementally to the underwater noise environment of the world's oceans. **Section 6.3.8** provides an analysis of the cumulative impacts of the Proposed Action relative to noise in the ocean. The main sources of vessel noise are propeller cavitation, propeller singing, and propulsion; other sources include auxiliaries, flow noise from water dragging along the hull, and bubbles breaking in the wake (Richardson et al. 1995). Vessel traffic is a major contributor to noise in the world's oceans, especially at low frequencies between 5 and 500 Hz (NRC 2003). During 2004, NOAA and a number of other government, industry, and academic partners convened the first formal meeting ("Shipping Noise and Marine Mammals: A Forum for Science, Management, and Technology") to consider the effects of sounds from large vessels on marine life. During 2007, NOAA convened a symposium to assess quieting applications for large commercial vessels.

Although each vessel has a unique acoustic signature, individual vessels are indistinguishable at a distance. Above 300 Hz, the level of weather-related noise might exceed shipping noise. Wind, wave, and precipitation noise originating close to the point of measurement dominate frequencies from 500 to 50,000 Hz. The ambient noise frequency spectrum and level can be predicted fairly accurately for most shallow-water areas based primarily on known shipping traffic density and weather or sea conditions (wind speed, Beaufort wind force, or sea state) (Urick 1983). Other anthropogenic sources of underwater noise include oil and gas drilling and production activities, seismic air guns, and SONARs. While the level of noise from ships is not of a magnitude likely to cause death, injury, or auditory trauma, the noise can affect the ability of marine mammals to communicate and receive information about their environment (Richardson et al. 1995). These sounds might frighten, annoy, or distract marine mammals and lead to physiological and behavioral disturbances. However, the incremental contribution of the planned SRV traffic to the level of vessel traffic in the GOM and the world oceans is minor. Moreover, compared to the world fleet, the SRVs would be newer ships, which tend to have several noise-mitigating characteristics such as quieter propulsion systems and deeper propellers that are less prone to cavitation (NRC 2003).

The acoustic transponder would emit a 30-kHz signal at 188 to 192 dB re μPa at 1m when signaled by an incoming SRV. This signal is within the functional hearing range of the manatee, but not in its range of best hearing (6 to 20 kHz). Noise modeling indicates that this signal would drop to below 180 dB re μPa at approximately 3 m (10 feet) and to 160 dB re μPa at approximately 32 m (106 feet) (see **Section 4.8** for additional detail regarding noise modeling.) Manatees are not expected to occur in the offshore component of the study area, and, as such, would not be impacted by the acoustic transponder. While rare

occurrences of the right whale and humpback whale are anticipated, the transponder's frequency is higher than that of the hearing range for both the humpback whale and right whale.

Entanglement. It is possible that ESA-listed marine mammals might become entangled in anchors, anchor lines, or buoy lines associated with operations of the Port in offshore waters. For example, as noted by NMFS (2007), whale entanglement in fishing vessel anchor lines has been documented historically; however, NMFS also notes that no information is available on the prevalence of such events. Because right whales and humpback whales are expected to be rare in the Project area and manatees are expected to be rare in the offshore Project area, the potential for such an event would be very low. Therefore, long-term, minor, direct and indirect, adverse impacts on ESA-listed marine mammals could occur due to the increased risk of entanglement during routine Port operations. With strict adherence to proposed BMPs, the potential for entanglement associated with construction activities of the Proposed Action would be minimized.

Lighting. SRVs would be guided to the submerged unloading buoys by two lighted buoys floating on the sea surface. The lighted buoys would include flashing yellow lights, with an average lighting level of 900 to 1,000 Candelas. Once SRVs are securely moored, lighted buoys would be taken on board and turned off. Moored SRVs would be required to exhibit light signals appropriate for vessels at anchor. Deck lights would also be used to illuminate working decks during LNG regasification activities. This would decrease any possible attraction by ESA-listed marine mammals to the area, thereby reducing their possible disorientation, vessel strikes, noise, predation, and entanglement. Additionally, right whales and humpback whales are expected to be rare in the Project area and manatees are expected to be rare in the offshore Project area, where Port operations occur. Long-term, minor, direct, adverse impacts on ESA-listed marine mammals would be expected to occur as a result of lighting used during routine Port operations.

Seawater Intake and Cooling Water Discharge. Seawater would be taken in through one of two sea chests covered with a lattice screen and used to cool the ship's engines. Marine mammals would not be directly impacted because they would be able to swim faster than the seawater intake velocity, which would not exceed 0.15 m/s (0.5 feet/s). Average swimming speeds for ESA-listed marine mammal species in the area of the Proposed Action include 2.2 to 4.0 m/s (7.2 to 13.1 feet/s) for humpback whales and 4.5 m/s (14.8 feet/s) for right whales (Noren 2004). Manatees are rarely observed in offshore waters and therefore would not likely be affected. Hartman et al. (1979) estimated a top swim speed of 6.25 m/s (20.5 feet/s) for manatees, though it should be noted that since manatees are rarely observed in offshore waters, they would likely not be affected by seawater intake. Seawater uptake might indirectly impact threatened and endangered marine mammals, since plankton species could be entrained and subsequently killed by the seawater intake system. Plankton mortality could indirectly impact invertebrate and fish populations that feed on plankton. There is no evidence, however, of feeding by humpback or North Atlantic right whales during their rare occurrences in the GOM; feeding grounds are off the northeastern United States for these two species, so no impacts are expected to these species either. No impacts on ESA-listed marine mammals would be expected to occur as a result of seawater intake associated with the Project.

Cooling water would be discharged at 10 °C (18 ° F) above ambient seawater temperature. Modeling indicates that cooling water temperature would be 1 °C (1.8 °F) above ambient temperature within 100 m (328 feet) of the discharge (see **Section 4.1.2.1**). The cooling water discharge is not expected to reach the seafloor. An increase in temperature could result in short-term behavioral and physiological impacts. Because the cooling water plumes compose a relatively small area, impacts are expected to be minor. Because the cooling water plumes compose a relatively small area and because right whales and humpback whales are expected to be rare throughout the Project area and manatees are expected to be rare in the offshore Project area, adverse affects are unlikely.

Other Routine Discharges. While SRVs are present at the Port, they would not discharge domestic waste, bilge water, or ballast water. In addition, on the SRVs, gutter bars would be replaced around equipment where oil leaks could occur (e.g., mooring winches, cranes). Rain water from these areas would be drained to a bilge holding tank. No rain water would be discharged overboard, from areas around equipment where oil leaks would occur, while at the buoy. The firewater system discharges consist of uncontaminated seawater from testing the firefighting system on the SRVs. Based on the infrequent nature of the discharge, its short duration, and the lack of contaminants, short-term, minor, direct and indirect impacts on ESA-listed marine mammals are expected to occur.

Marine Debris. Both entanglement in and ingestion of debris have caused the death of or serious injury to marine mammals (Laist 1997). The discharge and disposal of garbage and other solid debris from vessels by lessees is prohibited by the MMS (30 CFR 250.300) and the USCG (MARPOL Annex V, Public Law 100-220 [Statute 1458]) (33 CFR Part 151). The discharge of plastics, including ashes from burned plastics, is strictly prohibited and is therefore never authorized. All plastics must be returned to shore, and are tracked. These prohibitions on the discharge and disposal of garbage and other solid debris from vessels would be incorporated as enforceable conditions into the DWPA license. The USCG enforces MARPOL and the Deepwater Port License and fines or penalties could be assessed where laws and regulations are violated. Based on the measures that would be implemented to reduce the discharge of marine debris and the fact that right whales and humpback whales are expected to be rare throughout the Project area and manatees are expected to be rare in the offshore Project area, it is unlikely that ESA-listed marine mammals would be adversely impacted by marine debris associated with the operation of the Port. Short-term, minor, direct, adverse impacts on ESA-listed marine mammals could occur if marine debris were accidentally released during the Proposed Action.

Hydrocarbon Spills. Based on the amounts of hydrocarbons stored on the SRVs (see **Section 2.3.3**) and the fact that all SRVs are designed with features to minimize the potential for oil spills (see **Section 2.3.10**), the impact is designated as minor, short-term, and long-term. There would be no ship-to-ship fuel oil transfer and the Port would operate under the provisions of an approved oil spill contingency plan.

An oil spill in coastal waters could affect the West Indian manatee, humpback whale, and right whale should they come into direct contact with the spill. Marine mammals could incidentally ingest floating or submerged oil or tar or consume oil-contaminated food (Geraci 1990, St. Aubin and Lounsbury 1990). Spilled oil can foul the baleen fibers of mysticete whales, temporarily impairing food-gathering efficiency or resulting in the ingestion of oil or oil-contaminated prey (Geraci 1990). Spilled oil might affect the quality or availability of aquatic vegetation (St. Aubin and Lounsbury 1990). Because the distribution of this species is largely limited to coastal waters along the Florida peninsula, the West Indian manatee would be most vulnerable to a spill reaching the preferred river system and canals where it congregates.

Oil-spill response activities can affect marine mammals, either through exposure to response chemicals (e.g., dispersants or coagulants) applied to control or break down spilled surface oil, or through disturbance by or collision with spill response vehicles. The chemicals used during a spill response are toxic, but are considered much less so than the constituents of spilled oil (NRC 1989); there is little information regarding their potential effects on marine mammals. The presence of, and noise generated by, oil-spill response equipment and support vessels could temporarily disturb marine mammals in the vicinity of the response action, with affected individuals likely leaving the area. Oil-spill response support vessels can also increase the risk of collisions between these vessels and marine mammals in the vicinity of the spill response. It is unlikely that hydrocarbon spills associated with Port operation would adversely affect right whales, humpback whales, and manatees as they are unlikely to be found in the area surrounding the Port located in the offshore area. In addition, the SRVs are designed with features to minimize the potential for oil spills (see **Section 2.3.10**).

LNG Spills. Short-term, minor, direct, adverse impacts on ESA-listed marine mammals could occur in the unlikely event of an LNG spill. All SRVs are designed with features to minimize the potential for LNG spills (refer to Chapter 2, *Maritime Safety and Related Matters*). However, if an LNG spill were to occur, potential impacts would include exposure to low-temperature LNG at the water surface, possibly resulting in frostbite or death, and asphyxiation by natural gas vapors above the surface of the water. These impacts would likely occur in the immediate vicinity of the spill location; the timeframe of the impact is limited (see **Section 5**). Since LNG does not dissolve in water, the timeframe for these potential impacts would be limited, and no adverse toxic impacts would be expected after the LNG boiled off and the vapors dispersed.

Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

The process would probably result in temporary turbidity increases in the immediate vicinity of the proposed decommissioning activities. These increases would indirectly affect threatened and endangered marine mammals by impacting their food (see previous sections on *Turbidity*). Additionally, the presence of additional vessels during decommissioning and typical debris-removal practices could potentially affect ESA-listed marine mammals (see previous sections on *Vessel Traffic*). The Applicant specified that three types of vessels would be used during decommissioning as shown in **Table 4.10-2**, which includes one 4-point direct support vehicle (DSV) barge with a 30-ton crane, two tugs to support the DSV barge, and one crew/supply vessel (Port Dolphin 2008a). The Applicant specified that approximately 156-vessel trips would be required for decommissioning over the course of approximately 2 months (Port Dolphin 2007a, 2008a). For more information on vessel traffic associated with decommissioning activities, see **Section 4.10.1**.

Decommissioning activities would occur mainly in the STL buoy area and would not involve any activities along the pipeline route or in nearshore waters. Decommissioning involves no use of explosives. Monitoring efforts during decommissioning would detect presence of marine mammal species and mitigate any impacts. Short-term, minor to moderate, direct and indirect, adverse impacts on ESA-listed marine mammals could occur during Project decommissioning.

4.2.1.2.2 Alternatives

Table 4.2-7 compares impacts from the Proposed Action to each of the alternatives with respect to threatened and endangered marine mammals.

Southern Site and Route Alternative. Construction, operation, and decommissioning impacts on threatened and endangered marine mammals under the Southern Site Route Alternative would be similar to those under the Proposed Action. Impacts associated with turbidity would be slightly greater because the pipeline route would be longer.

Offshore Interconnection with Gulfstream Pipeline Alternative. Impacts on threatened and endangered marine mammals would be less than the Proposed Action under this alternative. Under this alternative the pipeline would not come inshore because of the connection to the Gulfstream pipeline. The connection would occur approximately 15 km (10 mi) from the mouth of Tampa Bay, in water with a bottom depth of 6 m (20 feet). Seafloor disturbance associated with pipeline disturbance under this alternative would be less in shallow coastal waters and would not occur in Tampa Bay. A more detailed description of seafloor disturbance under this alternative is described in detail under *Benthic Resources*. There would also be less of an impact of turbidity in shallow coastal waters associated with pipeline installation under this alternative. There would be no turbidity increases associated with pipeline installation in Tampa Bay under this alternative. The right whale and the humpback whale are the only ESA-listed marine mammal species with documented occurrences on the continental shelf off Florida; however, as noted earlier, these are very rare instances. Manatees are not expected to occur as far offshore as the offshore interconnection, though rare occurrences could take place. The pipeline route also does not pass through any of the designated manatee protection zones. Therefore, no impacts on manatees as a result of construction, operation, and decommissioning under this alternative would be expected.

FSRU Port Design Alternatives. Construction, operation, and decommissioning impacts on threatened and endangered marine mammals under the FSRU Alternative would be similar to those under the Proposed Action. The FSRU unit itself would require one set of anchors, as opposed to two sets of anchors for the SRVs included in the proposed Project. Also, use of the FSRU would not require a flexible riser to be pulled off the bottom as the buoy is raised to mate with the SRV. These features would result in decreased seafloor disturbance and turbidity associated with mooring line sweep and raising and lowering of the buoy. The discharge associated with the FSRU alternative would be fresh water. This discharge would travel a longer distance as a thin layer; therefore, the impacts would be minor.

AAV Alternative. Construction, operation, and decommissioning impacts on threatened and endangered marine mammals under the AAV Alternative would be similar to those under the Proposed Action.

Suction Piles Anchoring Alternative. Potential noise impacts associated with pile driving on threatened and endangered marine mammals under the proposed anchoring method (driving piles) would not occur with the use of the Suction Piles Anchoring Alternative. However, it should be noted that threatened and endangered marine mammals are not likely to be in the area affected by pile driving. Therefore, although the use of the Suction Piles Anchoring Alternative would be substantially less noisy than the proposed driven piles, the potential impacts on threatened and endangered marine mammals are likely to be the same (minor and short-term) for both alternatives because Federally-listed marine mammals are not expected to be in the proposed port area.

No Action Alternative. The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed port and the associated

pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, there would be no direct or indirect impacts from the Port on threatened and endangered marine mammals.

Alternative sources of natural gas might include other Deepwater LNG Ports or onshore LNG terminals. Other Deepwater LNG Ports might have impacts on threatened and endangered marine mammals that are similar to the Port Dolphin system but in a different geographic location. Onshore LNG terminals would be located in coastal areas where there could be a higher chance of impacting these species; however, it would depend on the location.

Table 4.2-7. Threatened and Endangered Marine Mammal Impacts Summary

Impact	Proposed Action	Southern Site and Route Alternative	Offshore Interconnection Alternative	FSRU Design Alternative	Suction Pile Anchoring Alternative
Pipeline construction	Minor, short-term, adverse impacts along pipeline route as a result of seafloor disturbance, noise, entanglement, and marine debris. Long-term impacts due to hydrostatic testing and discharges and lighting.	Short-term impacts higher than Proposed Action (longer route).	Short-term impacts lower than Proposed Action (shorter route and no nearshore impacts).	No difference from Proposed Action.	No difference from Proposed Action.
Port construction	Minor, short-term and long-term, adverse impacts in vicinity of Port as a result of seafloor disturbance, noise, entanglement, and marine debris. Long-term impacts due to lighting.	No difference from Proposed Action.	No difference from Proposed Action.	Short-term impacts as a result of seafloor disturbance and turbidity lower than Proposed Action (less anchors and no flexible riser).	Short-term impacts lower than Proposed Action (lower noise levels).
Operation of Port	Minor, short-term, adverse impacts in vicinity of Port as the result of seawater intake and cooling water discharge, routine discharges, marine debris, and potential LNG/hydrocarbon spills; long-term impacts due to noise, entanglement, lighting, seawater intake and discharge and potential hydrocarbon spills.	No difference from Proposed Action.	No difference from Proposed Action.	Short-term impacts comparable to Proposed Action; higher long-term impacts (cool freshwater discharge).	No difference from Proposed Action.
Decommission of Port	No impacts.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.

Notes:

1. Under the No Action Alternative none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur. No direct or indirect impacts on biological resources would be anticipated.
2. The AAV Vaporization Alternative was carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.2.1.3 Threatened and Endangered Sea Turtles

4.2.1.3.1 Proposed Action

As discussed in **Section 3.2.3**, the Maritime Administration has the responsibility under the ESA to determine whether or not the Project would adversely affect federally listed threatened or endangered sea turtles and their critical habitat. In accordance with Section 7 of the ESA, the Maritime Administration informally initiated consultation with the USFWS and NMFS on August 24, 2007. Federally listed sea turtles occurring in the northern GOM are listed in **Table 4.2-8**. Impacts of installation, operations, and decommissioning on sea turtles are summarized in **Table 4.2-9** (see **Section 4.2.1.3.2**).

Table 4.2-8. Federally Listed Sea Turtles Occurring in the Northern GOM

Common Name	Scientific Name	ESA status
Green sea turtle	*Chelonia mydas*	Threatened, endangered *
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Loggerhead sea turtle	*Caretta caretta*	Threatened
Olive ridley sea turtle	*Lepidochelys olivacea*	Threatened, endangered *

Note: * Although the species as a whole is listed as threatened, the Florida and Mexican Pacific nesting stocks of the green turtle and the Mexican Pacific nesting stocks of the olive ridley turtle are listed as endangered. Since the nesting areas for green and olive ridley turtles encountered at sea often cannot be determined, a conservative approach to management requires the assumption that all greens and olive ridleys found in the study area are endangered.

Construction

Seafloor Disturbance. Installation of Port components and pipelines would temporarily disrupt benthic habitat in the immediate vicinity of the construction areas. Of the six turtle species, the loggerhead, Kemp's ridley, green, and hawksbill are known to inhabit Tampa Bay and use benthic habitats for foraging. Although sea turtles do not directly use such habitat, they might feed on benthic species that could be temporarily displaced or destroyed by construction activities. Construction would result in a short-term loss of soft-bottom foraging habitat and a long-term loss of hard- and live-bottom foraging habitat. Most soft-bottom areas disturbed during pipeline burial would be backfilled and remain usable as potential foraging habitat. The areal extent of seafloor disturbance is approximately 3,756 hectares (9,272 acres), of which about 33 percent or 1,224.39 hectares (3,025.54 acres) would be hard- or live-bottom habitats. Most of the damage would occur during pipeline installation, including plowing of the seafloor, placement of barge anchors, and anchor sweep. Damage to the hard-bottom substrate is considered irreversible. The recovery of benthic communities associated with damaged hard-bottom areas would be much slower than for soft-bottom areas due to the slow growth rate of corals and other hard-bottom epibiota.

Seagrass beds and macroalgae are also important foraging habitat for sea turtles. In offshore areas deepwater seagrass patches of paddlegrass and macroalgae would be impacted either directly by mechanical damage during plowing or indirectly by a reduction of photosynthesis due to sediment redeposition. Paddlegrass is an annual seagrass species that regrows each year; therefore, locations of paddlegrass areas are very dynamic in nature (Hammerstrom et al. 2006, Dawes and Lawrence 1990). Consequently, impacts would not be long-term or permanent. In the nearshore areas, seagrass was observed predominantly near Manbirtee Island, the spoil island near Port Manatee, and in water depths

shallower than 2 m (7 feet) (Port Dolphin 2007b). The nearest seagrasses are 23 m (75 feet) to the southwest and greater than 59 m (194 feet) to the northeast of the HDD exit point. Therefore, seagrasses would be avoided. Therefore, it is unlikely that sea turtles would be adversely affected.

It is possible that an inadvertent release of drilling fluid, called a frac-out, could occur during HDD activities. If a frac-out were to occur, short-term sediment transport, water quality impacts, and bottom disturbance would likely occur. The FERC Procedures require the Applicant to develop an HDD Plan that includes a description of how a frac-out would be contained and cleaned up. The Applicant would file all HDD plans with the FERC staff prior to construction. The non-Federal agencies with jurisdiction over HDD in Tampa Bay include FDEP (habitat and submerged lands), Florida Fish and Wildlife Conservation Commission (FWC) (habitat and species), Tampa Port Authority (habitat and submerged lands in Tampa Bay), and Tampa Bay Regional Planning Council (regional planning council). Although Tampa Bay Regional Planning Council does not have a permitting process, they are a commenting agency for all proposed land alterations within the Tampa Bay Region. Because of the required plan to contain and clean up a frac-out, it is unlikely sea turtles would be affected by a frac-out, should one occur.

Short-term and long-term, minor, direct and indirect, adverse impacts on sea turtles could occur as a result of seafloor disturbance caused by construction.

Turbidity. Turbidity increases could cause sea turtles to avoid commonly used feeding or resting habitats. Adverse impacts on the seagrass beds and macroalgae could result from increases in turbidity. The main source of water quality impacts is pipeline trenching, which would produce turbidity along the pipeline route. Turbidity modeling indicates that the total areal extent of the turbidity plumes created during pipeline installation would be approximately 1,894 hectares (4,679 acres) (ASA 2008). The turbidity plumes would be short-lived and remain fairly close to their source.

Suspended sediments in the water column reduce light availability and, therefore, seagrass production; seagrass beds serve as feeding areas for sea turtles. Due to the temporary nature of water quality changes following construction activities, adverse impacts are expected to be minor and short-term during construction. Therefore, adverse effects on sea turtles would be unlikely. Short-term, minor, direct and indirect, adverse impacts on sea turtles could occur as a result of temporary turbidity increases caused by construction.

Hydrostatic Test Water Intake and Discharges. The proposed use of approximately 24 million gallons of filtered, surface seawater during flushing and hydrostatic testing of the pipeline would result in the entrainment of phytoplankton. The intake velocity (through-screen) for hydrostatic testing would be maintained below 0.15 m/s (0.5 feet/s). Average swimming speeds for sea turtle hatchlings are 0.44 m/s (1.43 feet/s) for green turtles, 0.36 m/s (1.17 feet/s) for loggerhead turtles, and 0.25 m/s (0.83 feet/s) for leatherback turtles (Wyneken 2001). These speeds are faster than both the average and maximum intake velocities, so hatchlings would likely be able to outswim the seawater intake. Therefore, no measurable direct impacts on sea turtles would be expected to occur as a result of seawater intake associated with the Project.

As stated in **Section 4.1.1,** hydrostatic testing would have a short-term, minor, localized impact on water quality. Therefore, short-term, negligible, indirect, localized impacts on sea turtles would occur as a result of hydrostatic testing.

Vessel Traffic. Sea turtles can be injured or killed if struck by a vessel, particularly if struck by an engaged propeller. Increased vessel traffic could result in a higher number of collisions between ships and sea turtles, thereby increasing the occurrence of serious sea turtle injuries or fatalities.

Although adult turtles are visible at the surface during the day and in clear weather, they can be difficult to spot from a moving vessel when resting below the water surface or during nighttime or periods of inclement weather. Sea turtles spend most of their lives submerged and thus are not visible by vessel operators. The average percentage of time spent submerged is 89 percent for Kemp's ridleys and 91 percent for greens (Meylan et al. 2003). While the risk of a vessel striking a sea turtle cannot be quantified, it is known to exist because of data from turtle stranding networks. A total of 298 records of dead or injured turtles exist for the inshore waters of the Tampa Bay area for 1980 through 2001. Boat-related injuries (including propeller wounds and possible boat collision injuries), were the most frequently observed carcass anomaly for loggerheads; 16 Kemp's ridleys and 1 hawksbill also showed evidence of boat injuries (Meylan et al. 2003).

The ability of an animal to appropriately respond to an approaching source of danger is constrained by how soon the animal can detect the danger. Knowledge of the sensory biology of sea turtles indicates that sound and light offer the only potential cues for detecting an approaching vessel. In one study of green turtles, flight initiation distances did not exceed 12 m (39 feet), possibly indicating a dependence on visual cues rather than sound cues. The proportion of turtles that fled to avoid the vessel decreased significantly as vessel speed increased. Turtles fled frequently in encounters with slow vessels (4 km per hour [km/h] [2.5 miles per hour (mph)]), infrequently in encounters with moderate vessel (11 km/h [6.8 mph]), and rarely in encounters with a fast vessel (19 km/h [11.8 mph]) (Hazel et al. 2007).

High volumes of vessel traffic adjacent to shallow foraging habitat could be particularly dangerous for turtles because of the tendency to flee towards deeper water and to use deeper water to rest between foraging bouts. The collision risk for turtles in all areas is likely to be further exacerbated when water clarity is low and during the night (Hazel et al. 2007). Supply vessels and crew/survey vessels would make regular trips between Port Manatee and the construction site for approximately 11 months. It is possible for sea turtles to be present in nearshore areas where seagrass has been observed (i.e., Spoil Island near Port Manatee). Potential indirect impacts include disruption of sea turtles' activities (foraging and nesting) and, in some cases, short- or long-term displacement from areas important for feeding and reproduction. Short-term changes in activity budgets that reduce amount of time feeding could represent long-term challenges by reducing energy acquisition. These short-term changes could also have a greater impact on a population depending on resource availability. The energetic consequences of one or more disturbance-induced periods of interrupted feeding have not been evaluated quantitatively. Energetic consequences would depend on whether suitable food is readily available.

Increases in vessel traffic (with no mitigation or monitoring) could potentially increase the likelihood for collisions with sea turtles, thereby increasing the occurrence of serious injuries or mortality. While it is known that an increase in vessel traffic increases the risk of collision, the probability of that risk cannot be quantified. If a sea turtle were to be struck, it would be considered a "take" under the ESA. Therefore, mitigation measures would be taken to minimize the potential for vessel collisions during construction.

Vessel traffic associated with the Proposed Action would be expected to result in short-term, minor, direct, adverse impacts on sea turtles.

Noise. The main noise sources include pile driving (at the STL buoy locations) and vessel engines. Pile driving would occur in offshore waters; therefore noise would not affect sea turtles in foraging, breeding, or nesting areas, which occur in nearshore waters approximately 48 km (30 mi) from the STL buoy locations.

Noise modeling indicates that sea turtles in the Project area could hear the broadband noise (over a wide range of frequencies) associated with construction of the deepwater port and pipeline. **Table 4.2-3** presents the distance from noise sources that Level A and Level B harassment of listed species could

occur for offshore construction activities. **Table 4.2-4** presents the distance from noise sources that Level A and Level B harassment of listed species could occur for inshore construction activities. Based on the types of noise and the distances affected, measures should be taken to reduce or avoid both Level A and Level B harassment on sea turtles.

The possibility of TTS exists for sea turtles. Lenhardt (2002) found that at received levels from 151 to 161 dB re 1 μPa, adult loggerheads showed a marked response (i.e., increased swimming speeds) and avoided areas where low-frequency air guns were being used at up to 175 dB re 1 μPa. However, they eventually habituated to these received levels. During the same trials, one turtle exhibited a TTS of more than 15 dB for up to 2 weeks after exposure to these received levels (Lenhardt 2002). Juveniles also have been found to avoid low-frequency sound (less than 1,000 kHz) produced by airguns (O'Hara and Wilcox 1990). TTS can last from minutes or hours to days and the magnitude of the TTS depends, upon other factors, on the level and duration of noise exposure. For sound exposures at or somewhat above the TTS level, hearing sensitivity usually recovers rapidly after exposure to the noise ends (Richardson et al. 1995). Because sea turtles would be expected to leave the area in response to activities associated with pre-construction preparation, auditory trauma such as TTS or PTS is unlikely. In addition, the Applicant has identified and committed to "ramp-up" procedures to reduce the likelihood of a sea turtle being exposed to the highest sound levels during pile driving (see **Section 4.11**). "Ramp-up" procedures would be used to gradually increase the sound intensity during pile driving and allow time for sea turtles to leave the area before the sound reaches its full intensity. The intent of ramp-up is to either avoid or reduce the potential for instantaneous hearing damage to an animal (from the sudden initiation of an acoustic source at full power) that might be located in close proximity. Numerous sources including the Marine Mammal Commission, NMFS, and the MMS note that the effectiveness of "soft start," although theoretically sound, has yet to be verified empirically (David 2006, Ragen 2008).

Behavioral responses to underwater noise can occur during pile driving. Avoidance behavior could reasonably be expected to occur at distances ranging from a few meters to a few hundred meters from a pile driver. Exposure to pile-driving noise could interrupt feeding, resting, or other behaviors or could cause a turtle to change its course of travel. The interruptions might continue for as long as the pile driving continues, or until the sea turtle could swim outside of the ZOI. Short-term changes in activity budgets that reduce amount of time feeding could represent long-term challenges by reducing energy acquisition. Energetic consequences would depend on whether suitable food is readily available. The energetic consequences of one or more disturbance-induced periods of interrupted feeding have not been evaluated quantitatively. Because of the limited areal extent of impacts and the short duration of the pile-driving activity, minor, short-term impacts on sea turtles are expected.

All six species of sea turtles (possibly present at the STL buoy locations and anywhere along the pipeline route) could be exposed to construction vessel noise. Although sounds created by construction equipment and vessels would be continuous during pipeline installation, activities would progress slowly along the route as the pipeline is laid, buried, and the trench backfilled. Thus, any one area would be subject to the maximum sound levels for only a day or two each time as the construction activities pass that area. It is likely that sea turtles would be able to hear low-frequency underwater noise from construction vessels and possibly experience some disturbance. The most likely impacts would be short-term behavioral changes such as diving and evasive swimming, disruption of activities, or departure from the area.

Short-term, minor, direct, adverse impacts on sea turtles could occur as a result of noise generated by construction vessels and machinery.

Entanglement. Entanglement of sea turtles in discarded fishing gear and other marine debris is a serious and growing problem (USFWS and NMFS 1992, 1993, 2008). Once entangled, turtles can be injured by the line itself, become susceptible to predation because of reduced mobility, or drown if they are unable to

surface for air. The risk of a sea turtle becoming entangled in buoy anchor lines is very low because the anchor chains would be large, heavy, and taut. In addition, there would be no horizontal link between anchor lines, eliminating this potential for entanglement. The derrick/lay barge could use up to 10 anchor cables, including the anchor, anchor line, and mid-line buoy. The mid-line buoy would be a single buoy and line used to suspend the anchor line to avoid dragging and scouring the seafloor. All lines would be greater than 10 cm (4 inches) in diameter. Anchor lines on the derrick/lay barge would be set and raised once during the installation of each unloading buoy, but they would be set and raised repeatedly during pipeline installation. Other construction vessels could also employ anchors and anchor lines.

Short-term, minor, direct, adverse impacts on sea turtles could occur as a result of entanglement during construction.

Lighting. The lighting associated with this Project's construction can affect nesting and hatching sea turtles adjacent to the shoreline where the construction would occur. The main issue concerning lighting and sea turtles is disorientation of hatchlings by artificial lighting on or near nesting beaches (Witherington 1997). Under natural conditions, hatching sea turtles typically emerge from nests at night and move toward the brightest, most open horizon which is over the ocean. However, when bright light sources are visible on the beach, they become the brightest spot on the horizon and attract hatchlings in the wrong direction making them more vulnerable to predators, desiccation, entrapment in debris or vegetation, and exhaustion, and often lure them onto roadways and parking lots where they are run over. Artificial lights can also disorient hatchlings once they reach the water. Electroretinography (ERG) data show that green turtles are most sensitive to light in the violet to orange region of the visible spectrum, from 400 to 640 nanometers. Green turtles, hawksbills, and olive ridleys were most strongly attracted to light in the near-ultraviolet to yellow region of the spectrum and were weakly attracted or indifferent to orange and red light. Loggerheads were most strongly attracted to light in the near-ultraviolet to green region. A light source emitting both 525-nanometer (green) and 645-nanometer (red) light, a source highly attractive to hatchlings, appears to a human observer to emit yellow light comparable to a 588-nanometer monochromatic source, which would be only weakly attractive to hatchlings (Witherington and Martin 1996).

Nearly all ocean-facing (Gulf) sandy beaches in the Tampa Bay area are used as nesting habitat by sea turtles, primarily loggerheads. The NMFS notes that attraction to offshore locations is less problematic than attraction to landside locations, as the issue is to ensure that hatchlings head to sea rather than remaining onshore. NMFS concludes that while some adverse effects could occur from brightly lit platforms, "it is unlikely that they would appreciably reduce the reproduction, numbers, or distribution of sea turtles in the wild" (NMFS 2001, 2002).

Short-term, minor, direct, adverse impacts on sea turtles could occur as a result of lighting used during construction.

Operations

Seafloor Disturbance and Turbidity. Operations activities would cause long-term disturbances in both soft- and hard-bottom habitat in the offshore portion of the Project area. The placement of buoy system parts, direct placement of the pipelines, and concrete mattresses along the pipeline route, as well as anchor sweep, would result in 36.76 acres of long-term disturbance on soft-bottom habitat and 34.53 acres of long-term disturbance on hard-bottom habitat. Although sea turtles do not directly use such habitat, they might feed on benthic species that could be temporarily displaced or destroyed by operation activities and thus minor, indirect, adverse impacts on sea turtles from seafloor disturbance and turbidity would be expected.

Vessel Traffic. Sea turtles can be injured or killed if struck by a vessel, particularly if struck by an engaged propeller. Increases in vessel traffic (with no mitigation or monitoring) could potentially increase the likelihood for collisions with sea turtles, thereby increasing the occurrence of serious injuries or mortality. While it is known that an increase in vessel traffic increases the risk of collision, the probability of that risk cannot be quantified.

Long-term, minor, direct, adverse impacts on sea turtles could occur as a result of vessel traffic associated with the Project.

Noise. Continuous, yet transient noise would be created by SRVs, support vessels, and pilot vessels in transit. The acoustic transponder would emit a 30-kHz signal at 188 to 192 dB re μPa when signaled by an incoming SRV. Therefore, this signal would not be within the hearing range of sea turtles, which generally range from 0.08 to 2 kHz with the best dynamic hearing range between 0.1 and 1 kHz (Ridgway et al. 1969, Lenhardt 1994, Moein et al. 1994, Moein Bartol et al. 1999). Overall, the amount of noise created by vessel traffic during routine Port operations would be consistent with other man-made underwater noise sources in the area (e.g., commercial shipping). Ambient underwater noise conditions are expected to vary, depending on factors such as wind and waves, precipitation noise, biological noise in the area, and tidally generated noise (JASCO 2008).

Entanglement. The possibility exists that a sea turtle could become entangled in the messenger or recovery line. Although there is evidence that some sea turtles take up residence, at least briefly or seasonally, at platforms or other hard-bottom structures, a statistical study of such associations in the GOM produced mixed results, with positive associations in a few areas but little or no association in others (Lohoefener et al. 1990). The buoy locations are in an area where extensive low-relief hard-bottom habitat already exists, so the subsea buoys would not constitute a unique feature likely to attract large numbers of turtles from surrounding areas. There would be two buoy locations in a small area, and relatively few turtles would be expected to encounter them. The likelihood of entanglement is very low because the anchor chains securing the unloading buoys would be large, heavy, and taut. In addition, there would be no horizontal link between anchor lines.

Long-term, minor, direct, adverse impacts on sea turtles could occur as a result of entanglement during operations.

Lighting. Offshore structures such as drilling rigs or drill ships typically are visible from shore at distances of 5 to 16 km (3 to 10 NM), and on a clear night, lights on top of offshore structures could be visible to humans on shore to a distance of approximately 32 km (20 NM) (MMS 2002b). Due to the distance offshore, lighting at the STL buoy locations is expected to have no detectable impact (beneficial or adverse) on sea turtle hatchlings. The buoy locations are 45 km (28 NM) offshore and, therefore, the associated lighting would not be visible to humans or turtle hatchlings. Also, the distribution of hatchlings in offshore waters is likely to be much more diffuse than at the nesting beach, and the chance of numerous turtle hatchlings encountering a particular offshore structure (e.g., a ship moored at the STL buoy) is remote. The average level of lighting at the vessel side (at sea level) would be 50 to 55 Lux, and at the buoy markers would be 900 to 1,000 Candela (Alards method) and a peak of 400 to 500 Candela (Clear lens).

As of 2005, there were more than 4,000 bottom-founded structures (e.g., jacketed platforms, caissons, and well protectors) and 29,500 well-related structures in the northern GOM (MMS 2005). Many of these structures are well-lit, and the MMS (2002b) speculated that if hatchlings were attracted to brightly lit platforms, they could be susceptible to increased predation since large birds and predatory fish also congregate around these structures. The NMFS addressed this issue in biological opinions (BOs) for several oil and gas lease sales in the GOM (NMFS 2001, 2002). The NMFS analysis notes that attraction

to offshore locations is less problematic than attraction to landside locations, as the issue is to ensure that hatchlings head to sea rather than remain onshore. NMFS concludes that while some adverse effects might occur from brightly lit platforms, "it is unlikely that they would appreciably reduce the reproduction, numbers, or distribution of sea turtles in the wild" (NMFS 2001, 2002).

Long-term, minor, direct, adverse impacts on sea turtles would be expected to occur as a result of lighting used during routine Port operations. BMPs would decrease light attraction by sea turtles thereby reducing their vulnerability to disorientation, vessel strikes, noise, predation, and entanglement.

Seawater Intake and Cooling Water Discharge. Seawater would be taken in through one of two sea chests covered with a lattice screen. The two intakes would be located 4.5 m (14.8 feet) and 7.5 m (24.6 feet) below the water line of a fully loaded vessel. The water intake velocity (through-screen) would be maintained below 0.15 m/s (0.5 feet/s) independent of vessel size. The speeds of several measured sea turtle hatchling species are faster than both the average and maximum intake velocities, so hatchlings would be able to outswim the seawater intake. Average swimming speeds for sea turtle hatchlings are 0.44 m/s (1.43 feet/s) for green turtles, 0.36 m/s (1.17 feet/s) for loggerhead turtles, and 0.25 m/s (0.83 feet/s) for leatherback turtles (Wyneken 2001). In addition, only juvenile and adult sea turtles would be present in the Project area and they would also be capable of outswimming the seawater intake. No measurable direct impacts on sea turtles would be expected to occur as a result of seawater intake associated with the Project.

Indirect, adverse impacts of seawater intake on sea turtles would primarily be associated with the impingement or entrainment of marine organisms. Impingement would occur if organisms became trapped against the seawater intake screens; entrainment would occur if small marine organisms (e.g., ichthyoplankton) were drawn into the seawater intake system. The mortality rate of all entrained organisms is conservatively assumed to be 100 percent. The entrainment and subsequent mortality of eggs, larvae, phytoplankton, and zooplankton would potentially impact the juvenile and hatchling sea turtles that feed on them. However, considering the overall availability of food in this area, these impacts would likely be immeasurable, if they occurred. Therefore, adverse impacts on sea turtles would be unlikely.

Long-term, minor, direct, adverse impacts on sea turtles would be expected to occur as a result of seawater intake associated with the Project.

Cooling water would be discharged at 10 °C (18 °F) above ambient seawater temperature. Modeling indicates that cooling water temperature would be 1 °C (1.8 °F) above ambient temperature within 100 m (328 feet) of the discharge. In compliance with NPDES permits, the cooling water discharge plume is not expected to reach the seafloor. An increase in temperature could result in adverse behavioral and physiological impacts. The main difference in comparison between sea turtles and marine mammals is that sea turtles are ectothermic (cold-blooded) animals and, thus, could potentially be more adversely affected by warmed seawater discharges from engine cooling. However, due to the localized nature of the discharges and dilution in the open ocean (MMS 2007c), it is unlikely that a threatened or endangered sea turtle would be within the discharge plume long enough for more than a minor impact to occur.

Most sea turtles would be expected to avoid the cooling water discharge during the summer months and be attracted to the cooling water during the winter months. There would be a marine growth prevention system on the SRV for ballast water treatment, but this system would not be used while at the buoy site. The effects of cooling water discharges would decrease water quality in a localized area but would be expected to dilute rapidly.

Long-term, minor, direct, adverse impacts on sea turtles would be expected to occur as a result of cooling water discharge associated with the Project.

Other Routine Discharges. Testing of the firefighting system associated with operation of the Port would comply with NPDES permit conditions. While SRVs are present at the Port, they would not discharge domestic waste, bilge water, or ballast water. In addition, on the SRVs, gutter bars would be replaced around equipment where oil leaks could occur (e.g., mooring winches, cranes). Rain water from these areas would be drained to a bilge holding tank. No rain water would be discharged overboard, from areas around equipment where oil leaks would occur, while at the buoy. The firewater system discharges consist of uncontaminated seawater from testing the firefighting system on the SRVs.

Based on the infrequent nature of the discharge, its short duration, and the lack of contaminants, impacts on sea turtles are expected to be short-term and minor.

Marine Debris. Sea turtles could be seriously injured or killed if they became entangled in or ingested construction debris or other materials accidentally released by SRVs moored at the Port, should that occur. Marine debris could also affect a sea turtle's ability to successfully migrate, feed, mate, or nest. The discharge and disposal of garbage and other solid debris from vessels by lessees is prohibited by the MMS (30 CFR 250.300) and the USCG (MARPOL Annex V, Public Law 100-220 [Statute 1458]) (33 CFR Part 151). The discharge of plastics, including ashes from burned plastics, is strictly prohibited and is therefore never authorized. All plastics must be returned to shore, and are tracked. These prohibitions on the discharge and disposal of garbage and other solid debris from vessels would be incorporated as enforceable conditions into the DWPA license. The USCG enforces MARPOL and the Deepwater Port License and fines or penalties could be assessed where laws and regulations are violated.

No food or garbage would be discharged into the sea. All such materials would be placed in proper containers and disposed of in accordance with applicable regulations. No wildlife would be fed or intentionally attracted to the SRVs or support vessels, and no fishing by crewmembers would be allowed. Given the relatively small potential for marine debris associated with the Project, measurable increases in sea turtle ingestion of or entanglement in debris would not be expected. Therefore, short-term, minor, direct, adverse impacts on sea turtles would be expected as a result of increased marine debris associated with routine Port operations.

Hydrocarbon Spills. A hydrocarbon spill associated with fuel and lubricating oil on the vessels could adversely affect sea turtles. Approximately 3 percent of annual south Florida sea turtle strandings are associated with oil spills. Oil spills in shipping lanes result in surface contamination along ocean tanker lanes and coastal areas. Like any living resource at risk, turtles are susceptible to a number of potential indirect impacts, which would generally be less obvious than short-term direct impacts such as mortality, but might ultimately cause more harm to populations. Dietary differences can potentially increase or decrease risk from hydrocarbon ingestion. Kemp's ridley and loggerhead turtles, for example, feed primarily on crustaceans and mollusks, which bioaccumulate petroleum hydrocarbons because they cannot efficiently clear contaminants from their bodies. Thus Kemp's ridleys and loggerheads might be at greater risk of exposure by ingesting food than leatherback turtles, which feed primarily on coelenterates. Trapped oil in sediments of intertidal beds of turtle grass (*Thalassia testudinum*) kills the seagrass, a significant component of green turtle diets. Decreases in invertebrates and sponge populations also affect hawksbills, loggerheads, and Kemp's ridleys (NOAA 2003).

There would be no ship-to-ship fuel oil transfer and the Port would operate under the provisions of an approved oil spill contingency plan. Vessels would be operated in compliance with all applicable spill prevention requirements and would have spill response plans. Short-term and long-term, minor, direct

and indirect, adverse impacts on sea turtles could result from a hydrocarbon spill associated with fuel and lubricating oil on the vessels.

LNG spills. The diving behavior of sea turtles puts them at risk in the unlikely event of an LNG spill. They rapidly inhale a large volume of air before diving and continually resurface over time. Adults doing this would experience extended physical exposure to the spill and prolonged exposure to vapors. Compared to hatchlings, however, juveniles and adults spend less time at the sea surface, which potentially reduces their chances of exposure (NOAA 2003). A release of natural gas would rise to the surface and dissipate. The pipeline would be monitored and be capable of being shut down in the event of a release. Pursuant to the USCG's deepwater port regulations, the USCG has prepared an Independent Risk Assessment to assess the risk and consequences of accidental and intentional events that compromise cargo containment.

Short-term, minor, direct, adverse impacts on sea turtles could result in the event of an LNG spill.

Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Therefore, impacts on sea turtles are expected to be reduced, although a specific timeline would be developed at the time of decommissioning and abandonment.

Impacts on sea turtles associated with the decommissioning of the project are expected to be similar to, but of less magnitude than, impacts during construction and installation activities. Short-term and long-term, minor, direct, and adverse impacts on MPAs would be expected during decommissioning of the project.

4.2.1.3.2 Alternatives

Table 4.2-9 compares impacts from the Proposed Action to each of the alternatives with respect to sea turtles.

Southern Site and Route Alternative. Construction, operation, and decommissioning impacts on sea turtles under the Southern Site Route Alternative would be similar to those under the Proposed Action.

Offshore Interconnection with Gulfstream Pipeline Alternative. Impacts on sea turtles would be less than the Proposed Action under this alternative. Under this alternative the pipeline would not come inshore because of the connection to the Gulfstream pipeline. Sea turtles generally inhabit shallow coastal waters and use the nearshore habitats for foraging, resting, and nesting. Therefore, construction, operation, and decommissioning impacts on sea turtles are expected to be minor under this alternative. Seafloor disturbance associated with pipeline disturbance under this alternative would be less in shallow coastal waters and would not occur in Tampa Bay. A more detailed description of seafloor disturbance under this alternative is described in detail under Benthic Resources. There would also be less of an impact of turbidity in shallow coastal waters associated with pipeline installation under this alternative. There would be no turbidity increases associated with pipeline installation in Tampa Bay under this alternative.

FSRU Port Design Alternatives. Construction, operation, and decommissioning impacts on sea turtles under the Southern Site Route Alternative would be similar to those under the Proposed Action. The FSRU unit itself would require one set of anchors, as opposed to two sets of anchors for the SRVs included in the proposed Project. Also, use of the FSRU would not require a flexible riser to be pulled off the bottom as the buoy is raised to mate with the SRV. These features would result in decreased seafloor disturbance and turbidity associated with mooring line sweep and raising and lowering of the buoy. The discharge associated with the FSRU alternative would be fresh water. This discharge would travel a longer distance as a thin layer; therefore, the impacts would be minor.

AAV Alternative. Construction, operation, and decommissioning impacts on threatened and endangered sea turtles under the AAV Alternative would be similar to those under the Proposed Action.

Suction Piles Anchoring Alternative. Potential noise impacts associated with pile driving on threatened and endangered sea turtles under the proposed anchoring method (driving piles) would not occur with the use of the Suction Piles Anchoring Alternative. The Suction Piles Anchoring Alternative would result in short-term, minor impacts on threatened and endangered sea turtles, which is similar to the Proposed Action, but substantially less than the Proposed Action because the noise that would be produced by installation of the piles would be substantially lower.

No Action Alternative. The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In

addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, no direct or indirect adverse impacts on sea turtles would be expected.

Table 4.2-9. Sea Turtle Impacts Summary

Impact	Proposed Action	Southern Site and Route Alternative	Offshore Interconnection Alternative	FSRU Design Alternative	AAV Alternative	Suction Pile Anchoring Alternative
Pipeline construction	Minor, short-term, adverse impacts along pipeline route as a result of seafloor disturbance, turbidity, hydrostatic testing, vessel traffic, noise, entanglement, and lighting; long-term impacts due to loss of habitat from seafloor disturbance.	Short-term impacts comparable to Proposed Action; somewhat higher long-term impacts (longer route).	Short-term impacts comparable but lower than Proposed Action (no impacts nearshore); lower long-term impacts (shorter route).	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.
Port construction	Minor, short-term, adverse impacts in vicinity of Port as a result of seafloor disturbance, turbidity, vessel traffic, noise, lighting, and entanglement,; long-term impacts due to loss of habitat from seafloor disturbance.	No difference from Proposed Action.	No difference from Proposed Action.	Short-term impacts comparable to Proposed Action; lower long-term impacts (less anchors and no flexible riser).	No difference from Proposed Action.	Short-term impacts lower than Proposed Action (lower noise levels).
Operation of Port	Minor, short-term, adverse impacts in vicinity of Port as a result of routine discharges, marine debris, and potential LNG/hydrocarbon spills; long-term impacts due to seafloor disturbance, turbidity, vessel traffic, noise, entanglement, lighting, seawater intake and discharge, and potential LNG/hydrocarbon spills.	No difference from Proposed Action.	No difference from Proposed Action.	Short-term impacts comparable to Proposed Action; higher long-term impacts (cool freshwater discharge).	Short-term impacts comparable to Proposed Action; higher long-term impacts (higher seawater intake and discharge).	No difference from Proposed Action.
Decommission of Port	Minor, short-term and long-term, adverse impacts in vicinity of Port are similar to but lower than port construction impacts.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.

Note: Under the No Action Alternative none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur. No direct or indirect impacts on biological resources would be anticipated.

4.2.1.4 Threatened and Endangered Coastal and Marine Birds

4.2.1.4.1 Proposed Action

The Project area is inhabited by a diverse assemblage of resident and migratory birds, including seabirds, shorebirds, wetland birds, and waterfowl including six endangered or threatened bird species identified in **Table 4.2-10**. Of these species, only the piping plover (*Charadrius melodus*), listed as threatened, and wood stork (*Mycteria americana*), listed as endangered, are known to inhabit or frequent coastal areas and waters of the inner continental shelf where project activities would be located, and thus the other four species listed in **Table 4.2-10** would not be affected by project activities.

Table 4.2-10. Federally Listed Birds in Hillsborough, Manatee, Pinellas Counties, Florida

Common Name	Scientific Name	Federal Status
Audubon's Crested Caracara	*Polyborus plancu audubonii*	Threatened
Bald Eagle	*Haliaeetus leucocephalus*	Threatened
Florida Scrub-jay	*Aphelocoma coeruluscens*	Threatened
Piping Plover	*Charadrius melodus*	Threatened, critical habitat
Red-cockaded Woodpecker	*Picoides borealis*	Endangered
Wood Stork	*Mycteria americana*	Endangered

Source: USFWS 2007a

Only three piping plover individuals have been recorded within the St. Petersburg survey area last year; none within the Alafia Banks Sanctuary, the Tampa survey area, or the Bradenton survey area (Audubon Society 2007). Critical habitat for wintering piping plovers is designated on Egmont Key in Hillsborough County (66 FR 36038 36086). Although foraging wood storks were observed in the Project area during the October–November 2007 field surveys, rookeries are not known within or adjacent to the proposed construction area (Port Dolphin 2007b). Impacts of installation, operations, and decommissioning on threatened and endangered birds are summarized in **Table 4.2-11** (see **Section 4.2.1.4.2**).

Construction

Vessel Traffic. Traffic increases associated with construction would be short-term and temporary. Approximately 1,800 vessel trips are anticipated during the construction of Port Dolphin (within 11 months). Vessel traffic could result in degraded water quality and disturbance of foraging/reproductive activity. Disturbance often curtails breeding success; excessive disturbance can cause individuals to desert the nest, exposing eggs or chicks to the elements and predation. Interrupted feedings can stress juvenile birds during critical periods in their development (USFWS 2007c). The Project area is a busy Port with vessel traffic. Foraging wood storks in the Project area are currently exposed to vessel traffic. The Proposed Route is approximately 1,750 m (5,742 feet) south Egmont Key NWR, which is designated as critical habitat for wintering piping plovers.

Short-term, minor, direct and indirect, adverse impacts would be expected as a result of increased vessel traffic generated by construction.

Noise. Localized, short-term increases in noise associated with construction could potentially affect coastal birds. The level of impact would vary depending on the bird species, type of vessel or machinery, vessel speed, relative noise level, distance, frequency, and season (MMS 2002b). During Project

installation, increased noise levels could temporarily displace coastal and marine birds from commonly used feeding or resting areas, but displaced birds would be expected to return shortly after construction ceased. During construction, increased noise levels could temporarily displace foraging wood storks and piping plover, but displaced individuals would be expected to return shortly after construction ceased. The lay barge and support vessels move very slowly down the pipeline corridor during installation activities to decrease the level of disturbance from wakes. Any local noise ordinances would also dictate construction work hours in this area. Animals, in general, tend to become less sensitive to those types of noise and disturbance to which they are repeatedly exposed (Richardson et al. 1995). Because the Proposed Action occurs in a busy Port, wood storks and piping plovers would be expected to have adapted to the variety of noise levels associated with Port Manatee and local industry. Therefore, impacts on wood storks and piping plovers would be negligible.

Short-term, minor, direct and indirect, adverse impacts on wood storks could occur as a result of noise associated with construction.

Lighting. The use of lights on construction and support vessels would be short-term, temporary, and transient. The use of solid or pulsating red lights would be avoided, and all vessel lights would be downshielded to minimize visibility to birds above. Construction activities would be performed to avoid sensitive areas during bird nesting season, to the extent practicable. In North Florida these birds are more numerous in summer than in winter, indicating a fall migration to South Florida (FWC 2003).

Long-term, minor, direct, adverse impacts on threatened and endangered coastal and marine birds would be expected to occur as a result of lighting used during routine Port operations.

Operations

Vessel Traffic. Traffic increases associated with routine Port operations would be minor compared to the total vessel traffic in the Project area (see **Section 3.10.2**). Proposed vessel routes would avoid sensitive receptors (e.g., bird colonies) to the extent feasible and the Applicant has committed to limiting the number of vessel trips as much as possible. These restrictions would be mandated on all vessels, except when USCG regulations or safety precautions supersede them. Use of proposed vessel routes would reduce physical contact; therefore, impacts on threatened and endangered coastal and marine birds would be negligible. Therefore, SRVs and support vessels in transit to and from the Port could result in long-term, minor, direct, adverse impacts on threatened and endangered coastal and marine birds.

Noise. Noise created by SRVs and support vessels in transit to and from the Port would be continuous, yet transient, for short periods of time. Animals, in general, tend to become less sensitive to those types of noise and disturbance to which they are repeatedly exposed (Richardson et al. 1995). Because the construction activities, associated with the Proposed Action, occur in a busy Port and shipping channel, wood storks and piping plovers would be expected to have adapted to the variety of noise levels associated with Port Manatee and local industry.

Long-term, minor, direct, adverse impacts on threatened and endangered coastal and marine birds could occur as a result of the noise created during routine Port operations.

Lighting. Lighting aboard SRVs would be low, and all lights would be installed and utilized in accordance with USFWS guidelines designed to reduce migratory bird impacts (USFWS 2000). The use of solid or pulsating red lights would be avoided, and all vessel lights would be downshielded to minimize visibility to birds above.

Long-term minor, direct, adverse impacts on wood storks would be expected to occur as a result of lighting.

Seawater Intake and Cooling Water Discharge. Seawater intakes would be below the sea surface, which would preclude birds from being entrained or impinged. Cooling water would be discharged at 10 °C (18 °F) above ambient seawater temperature. Due to dilution in the open ocean and because the cooling water plumes compose a relatively small localized area, impacts are expected to be negligible.

Negligible impacts on wood storks would occur as a result of seawater intake and cooling water discharges associated with the Project.

Other Routine Discharges. Routine discharges from project-related vessels (i.e., grey water) would have an effect on water quality and therefore an indirect effect on birds. Due to dilution in the open ocean and because the discharges would be localized, impacts on threatened and endangered birds are expected to be negligible.

Marine Debris. Wood storks foraging in the Project area could be seriously injured or killed if they became entangled in or ingested construction debris or other materials accidentally released by SRVs moored at the Port. Marine debris could also affect a bird's ability to successfully migrate, feed, mate, or nest. The discharge and disposal of garbage and other solid debris from vessels by lessees is prohibited by the MMS (30 CFR 250.300) and the USCG (MARPOL Annex V, Public Law 100-220 [Statute 1458]) (33 CFR Part 151). The discharge of plastics, including ashes from burned plastics, is strictly prohibited and is therefore never authorized. All plastics must be returned to shore, and are tracked. These prohibitions on the discharge and disposal of garbage and other solid debris from vessels would be incorporated as enforceable conditions into the DWPA license. The USCG enforces MARPOL and the Deepwater Port License and fines or penalties could be assessed where laws and regulations are violated.

In addition, no food or garbage would be discharged into the sea. All such materials would be placed in proper containers and disposed of in accordance with applicable regulations. No wildlife would be fed or intentionally attracted to the SRVs or support vessels, and no fishing by crewmembers would be allowed. Given the relatively small amount of marine debris associated with the Project, major increases in coastal and marine bird ingestion of or entanglement in debris would not be expected. The relatively small amount of marine debris potentially generated at the Port, along with required avoidance measures would result in minor, adverse impacts on threatened and endangered coastal and marine birds.

Therefore, short-term, minor, direct, adverse impacts on wood storks and piping plovers would be expected as a result of marine debris associated with the Project.

Hydrocarbon Spills. The impacts of hydrocarbons on wood storks and piping plovers are caused by the physical and chemical nature of the spill, by clean-up operations, or indirectly through physical damage to the foraging habitats in the Project area. There would be no ship-to-ship fuel oil transfer and the Port would operate under the provisions of an approved oil spill contingency plan. Vessels would be operated in compliance with all applicable spill prevention requirements and would have spill response plans. Short-term to long-term, minor, direct and indirect, adverse impacts on wood storks and their habitat could result from the unlikely occurrence of a hydrocarbon spill.

LNG Spills. Potential impacts would include exposure to low-temperature LNG at the water surface, possibly resulting in frostbite or death, and asphyxiation by natural gas vapors above the surface of the water. These impacts would likely occur in the immediate vicinity of the spill location; the timeframe of the impact is limited. Since LNG does not dissolve in water, the timeframe for these potential impacts would be limited, and no adverse toxic impacts would be expected after the LNG boiled off and the

vapors dispersed. Because of the low temperatures in the vicinity of the spill, coastal and marine birds would be expected to avoid the area. Because wood storks and piping plovers would be located inshore, LNG spills would not be likely to adversely affect listed coastal and marine bird species.

Short-term to long-term, minor, direct, adverse impacts on threatened and endangered coastal and marine birds could occur in the unlikely event of an LNG spill.

Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Therefore, impacts on threatened and endangered coastal and marine birds are expected to be reduced, although a specific timeline would be developed at the time of decommissioning and abandonment.

Short-term, minor to moderate, direct and indirect, adverse impacts on threatened and endangered coastal and marine birds could occur during Project decommissioning.

4.2.1.4.2 Alternatives

Table 4.2-11 compares impacts from the Proposed Action to each of the alternatives with respect to threatened and endangered coastal and marine birds.

Southern Site and Route Alternative. Construction, operation, and decommissioning impacts on threatened and endangered coastal and marine birds under the Southern Site Route Alternative would be similar to those under the Proposed Action.

In comparison with the Proposed Route, the Southern Route Alternative is closer to Passage Key and farther from Egmont Key (see **Figure 3-1 of Appendix G, Biological Assessment**). This results in negligible impacts on the wintering piping plover population at Egmont Key NWR.

Offshore Interconnection with Gulfstream Pipeline Alternative. Impacts on threatened and endangered coastal and marine birds would be less than the Proposed Action under this alternative. Under this alternative the pipeline would not come inshore because of the connection to the Gulfstream pipeline. Wood storks and piping plovers are found in wetland and coastal habitats respectively and thus would not be impacted under this alternative. Seafloor disturbance associated with pipeline disturbance under this alternative would be less in shallow coastal waters and would not occur in Tampa Bay. A more detailed

description of seafloor disturbance under this alternative is described in detail under Benthic Resources. There would also be less of an impact of turbidity in shallow coastal waters associated with pipeline installation under this alternative. There would be no turbidity increases associated with pipeline installation in Tampa Bay under this alternative. Therefore, no construction, operation, and decommissioning impacts on threatened and endangered coastal and marine birds would be expected under this alternative.

FSRU Port Design Alternatives. Construction, operation, and decommissioning impacts on threatened and endangered coastal and marine birds under the FSRU Port Design Alternative would be similar to those under the Proposed Action. The discharge associated with the FSRU alternative would be fresh water. This discharge would travel a longer distance as a thin layer; therefore, the impacts would be minor.

AAV Alternative. Construction, operation, and decommissioning impacts on threatened and endangered coastal and marine birds under the AAV Alternative would be similar to those under the Proposed Action.

Suction Piles Anchoring Alternative. Construction, operation, and decommissioning impacts on threatened and endangered coastal and marine birds under the Suction Piles Anchoring Alternative would be similar to those under the Proposed Action.

No Action Alternative. The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, no direct or indirect impacts on threatened and endangered coastal and marine birds would be expected.

Table 4.2-11. Threatened and Endangered Coastal and Marine Birds Impacts Summary

Impact	Proposed Action	Southern Site and Route Alternative	Offshore Interconnect Alternative	FSRU Design Alternative
Pipeline construction	Minor, short-term, adverse impacts along pipeline route as a result of vessel traffic and noise.	Short-term impacts slightly lower than Proposed Action (route farther from Egmont Key wintering plovers).	Short-term impacts lower than Proposed Action (shorter route and no nearshore impacts).	No difference from Proposed Action.
Port construction	Minor, short-term, adverse impacts in the vicinity of the Port as a result of vessel traffic and noise.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.
Operation of Port	Minor, short-term, adverse impacts due to marine debris and potential LNG/hydrocarbon spills; long-term impacts due to vessel traffic, noise, lighting, and potential LNG/hydrocarbon spills.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.
Decommission of Port	Minor, short-term and long-term, adverse impacts in vicinity of Port are similar to but lower than port construction impacts.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.

Notes:

1. Under the No Action Alternative none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur. No direct or indirect impacts on biological resources would be anticipated.
2. The AAV and Suction Pile Anchoring Alternatives were carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.2.1.5 Threatened and Endangered Fish Species

4.2.1.5.1 Proposed Action

The threatened and endangered fish species that occur in the project area are presented in **Table 4.2-12.** Smalltooth sawfish are expected to be rare in the terminal area and offshore areas of the pipeline, but would have a greater likelihood for interaction in the shallower, nearshore areas of the pipeline. However, smalltooth sawfish occurrence in the nearshore pipeline installation area is expected to be sporadic (NMFS 2009) (see **Section 3.2.4.4**). Gulf sturgeon are expected to be rare in both the terminal and Pipeline areas (see **Section 3.2.4.4**). Additionally, critical habitat for smalltooth sawfish is greater than 40 NM from the Project area and critical habitat for Gulf sturgeon is greater than 90 NM from the Project area.

Table 4.2-12. Federally Listed Fish Species in the Vicinity of the Project

Common Name	Scientific Name	ESA status
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Threatened
Smalltooth sawfish	*Pristis pectinata*	Endangered

Construction

Short-term, minor, direct, adverse impacts on smalltooth sawfish and Gulf sturgeon could occur as a result of seafloor disturbance, turbidity, hydrostatic test water intake and discharge, noise, entanglement, and lighting. Seafloor disturbance could degrade potential smalltooth sawfish habitat (primarily mud or soft-bottom sediments) during construction in the inshore pipeline area. However, smalltooth sawfish occurrence in the inshore pipeline installation area is expected to be sporadic (NMFS 2009). Proper design and implementation of BMPs and mitigation are expected to be effective in reducing the magnitude and extent of impacts resulting from construction activities and therefore, the impact on smalltooth sawfish and Gulf sturgeon. However, the performance of the measures should be monitored during construction to verify their effectiveness.

Operation

Smalltooth sawfish and Gulf sturgeon inhabit coastal and inshore waters (NMFS 2009, USFWS 2004). Additionally, because smalltooth sawfish (which only occurs in the Everglades with any regularity) and Gulf sturgeon (recent sightings are limited to Alabama, Mississippi, and the Florida panhandles) are expected to be uncommon in offshore areas (see **Section 3.2.4.4**). As such, smalltooth sawfish and Gulf sturgeon are expected to be rare in the STL buoy area. Therefore, no adverse impacts on smalltooth sawfish or Gulf sturgeon would occur as a result of the operation of the Port.

Decommissioning

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action. Decommissioning activities would result in restrictions similar to those described for the construction process. Due to the in-place abandonment procedures for the pipeline, decommissioning activities are anticipated to take less time than construction. Smalltooth sawfish and Gulf sturgeon inhabit coastal and inshore waters (NMFS 2009, USFWS 2004). Additionally, because smalltooth sawfish (which only occurs in the Everglades with any regularity) and Gulf sturgeon (recent sightings are limited to Alabama, Mississippi, and the Florida panhandles) are expected to be uncommon in the offshore areas (see **Section 3.2.4.4**). As such, smalltooth sawfish and Gulf sturgeon are expected to be rare in the STL buoy area. Impacts associated with decommissioning would occur mostly in the STL buoy area because various Port components (e.g., anchor chains, unloading buoys, and piles) would be removed and retrieved. No explosives would be used for the removal of these components.

Impacts along the pipeline route would not be expected. The ends of the pipeline would be capped, filled, and left in place (subject to the terms of negotiated land lease conditions). Therefore, no adverse impacts on smalltooth sawfish and Gulf sturgeon would occur as a result of decommissioning.

4.2.1.5.2 Alternatives

Table 4.2-13 compares impacts from the Proposed Action to each of the alternatives with respect to threatened and endangered fish species.

Southern Site and Route Alternative. Construction, operation, and decommissioning impacts on smalltooth sawfish and Gulf sturgeon under the Southern Site Route Alternative would be similar to those under the Proposed Action.

Offshore Interconnection with Gulfstream Pipeline Alternative. Impacts on smalltooth sawfish and Gulf sturgeon would be less than the Proposed Action under this alternative. Under this alternative, the pipeline would not come inshore because of the connection to the Gulfstream pipeline. The connection would occur approximately 16 km (10 mi) from the mouth of Tampa Bay, in water depth of 6 m (20 feet). Seafloor disturbance associated with pipeline disturbance under this alternative would be less in shallow coastal waters and would not occur in Tampa Bay. A more detailed description of seafloor disturbance under this alternative is described in detail under Benthic Resources. There would also be less of an impact of turbidity in shallow coastal waters associated with pipeline installation under this alternative. There would be no turbidity increases associated with pipeline installation in Tampa Bay under this alternative. Smalltooth sawfish and Gulf sturgeon inhabit coastal and inshore waters (NMFS 2009, USFWS 2004). Additionally, smalltooth sawfish (which only occurs in the Everglades with any regularity) and Gulf sturgeon (recent sightings are limited to Alabama, Mississippi, and the Florida panhandles) are expected to be uncommon in the Project area (see **Section 3.2.4.4**). Therefore, no construction, operation, and decommissioning impacts on smalltooth sawfish and Gulf sturgeon would be expected under this alternative.

FSRU Port Design Alternatives. Construction, operation, and decommissioning impacts on smalltooth sawfish and Gulf sturgeon under the FSRU Port Design Alternative would be similar to those under the Proposed Action.

AAV Alternative. Construction, operation, and decommissioning impacts on threatened and endangered fish species under the AAV Alternative would be similar to those under the Proposed Action.

Suction Piles Anchoring Alternative. Potential noise impacts associated with pile driving on threatened and endangered fish species under the proposed anchoring method (driving piles) would not occur with the use of the Suction Piles Anchoring Alternative. However, it should be noted that threatened and endangered fish species are found in nearshore areas, and thus are not likely to be in the area affected by pile driving. Therefore, although the use of the Suction Piles Anchoring Alternative would be substantially less noisy than the proposed driven piles, the potential impacts on threatened and endangered fish species are likely to be the same (minor and short-term) for both alternatives because Federally-listed fish species are not expected to be in the proposed port area.

No Action Alternative. The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated

pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, no direct or indirect impacts on smalltooth sawfish and Gulf sturgeon would be expected. Alternative sources of natural gas might include other Deepwater LNG Ports or onshore LNG terminals. Other Deepwater LNG Ports might have impacts on smalltooth sawfish and Gulf sturgeon that are similar to the Port Dolphin system but in a different geographic location. Onshore LNG terminals would be located in coastal areas where there could be a higher chance of impacting these species; however, it would depend on the location.

Table 4.2-13. Threatened and Endangered Fish Species Impacts Summary

Impact	Proposed Action	Offshore Interconnect Alternative
Pipeline construction*	Minor, short-term, adverse impacts along pipeline route as a result of seafloor disturbance, turbidity, hydrostatic testing, and noise.	Short-term impacts lower than Proposed Action (shorter route and no nearshore impacts).

Notes:

* Only impacts associated with pipeline construction are presented in the table because the T&E fish species are not expected to occur in the offshore Project area.

1. Under the No Action Alternative none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur. No direct or indirect impacts on biological resources would be anticipated.
2. The Southern Site and Route, AAV, FSRU Port Design, and Suction Piles Alternatives were carried forward but not presented in the table because there were no differences from the construction of the Proposed Action. Impacts of these alternatives are similar to the Proposed Action in the inshore waters of Tampa Bay, which is where the Gulf sturgeon and smalltooth sawfish have the potential to occur.

4.2.1.6 Benthic Resources

4.2.1.6.1 Proposed Action

Construction

Seafloor Disturbance. Approximately 9,972 acres of soft-bottom and hard-bottom benthic habitat would be directly impacted from pipeline installation, buoy anchor installation, and anchoring impacts of

construction vessels along the construction pathway. A detailed description of the direct impact of each activity that would disturb the seafloor is presented in **Table 4.2-14**.

Table 4.2-14. Estimate Extent of Direct Impacts on Benthic Habitats for the Proposed Location and Route

Activity	Habitat Type Affected (acre)*				
	Soft Bottom	Hard Bottom			Total
		Type A	Type B	Type D	
Construction					
STL Subsea System – barge anchoring	0.11	0.00	0.06	0.00	0.17
Pipeline installation – plowing	207.13	15.48	38.52	55.72	316.85
Pipeline installation – mattress placement	8.60	0.00	4.43	0.00	13.03
Clamshell/dragline	1.28	0.24	0	0	1.52
Anchoring	18.57	1.61	4.63	2.75	27.56
Anchor cable sweep	5,989.69	519.62	1,497.20	885.35	8,891.86
Total	**6,225.38**	**536.95**	**1544.84**	**943.82**	**9,250.99**
Operation					
STL Landing Pad	0.26	0.00	0.00	0.00	0.26
PLEM	0.04	0.00	0.00	0.00	0.04
Anchors/piles	0.10	0.00	0.04	0.00	0.14
Concrete mattresses along pipeline route	8.60	0.00	4.43	0.00	13.03
Anchor sweep (STL buoy)	15.71	0.00	6.39	0.00	22.1
Total	**24.71**	**0**	**10.86**	**0**	**35.57**
Decommissioning					
STL subsea system removal	0.26	0	0.00	0	0.26
Accidents or Upsets					
Accidental release of drilling muds could cover benthos	**	**	**	**	**

Source: Port Dolphin 2008a

Notes: Initial surveys were conducted between 17 August and 14 December 2006. After consultation with Florida Fish and Wildlife Conservation Commission, additional surveys for nearshore routes were resurveyed between 16 September and 19 October 2007.

* Note that this table includes direct impacts on benthic habitat only and does not include indirect impacts such as sediment drape associated with resuspended sediments.

** This impact is not quantifiable at this time. Type A = 20–100 percent cover by epibenthic biota or hard bottom with greater than or equal to 0.25 m (0.8 feet) in relief, inclusive of sand components integral to these habitats. EFH, Habitat Area of Particular Concern; Type B = 5–20 percent cover by attached epibenthic bio or hard bottom with less than .25 m (0.8 feet) in relief, inclusive of sand components integral to these habitats. EFH, Habitat Areas of Particular Concern; Type C = Breakwater spoil area; EFH, Habitat Area of Particular Concern; Type D = Sand (Soft Substrate/Sedimentary Habitat) in proximity to reef/hard-bottom resources, a sandy veneer over hard substrate with less than 5 percent epibenthic coverage, EFH.

Table 4.2-14 includes a conservative estimate of direct construction installation anchoring impacts (associated with pipelaying, plowing, and backfilling); therefore, impacts are expected to be less than calculated. Additionally, many aspects of the anchor sweep calculations are conservative. Consequently, impacts are likely to be less than calculated. Further reductions could be possible depending on prevailing field and operational conditions. For example:

- A relatively large ratio of anchor wire length to water depth (sometimes known as the anchor "scope") has been conservatively assumed in the ratio range of about 20 to 50. The "scope" could be reduced with judicious anchor placement, subject to detailed route engineering (see Applicant Proposed BMPs in **Section 4.11.1**).
- There is some degree of overlapping (redundancy) in the swept area calculations between anchor resetting positions, which has not been accounted for in the results. Specifically, as the barge moves along the route, some of the swept areas would be locations that have already have been swept and thus are "double-counted."
- There would most likely be a degree of overlapping (redundancy) of seafloor impact areas between the different passes (pipelaying, plowing, and backfilling), which has not been accounted for in the final results presentation. With judicious anchor placement on each pass this could represent a substantial impact area that is being "double-counted."

Plans for installation of the STL buoy and the pipeline have been developed to minimize impacts on hard and live bottom, as well as sand resources and the Terra Ceia AP (Port Dolphin 2008b). The estimated linear extent of each pipeline burial technique is presented in **Table 4.2-15**. Approximately 87 percent of the pipeline would be plowed. Some of the plowed areas might require additional rock armoring if the required installation depth cannot be achieved. These plans include the use of midline buoys to minimize anchor sweep during pipeline installation.

Table 4.2-15. Estimated Linear Extent of Pipeline Burial Techniques

Burial Technique	Proposed Pipeline Route
Plowing/trenching	62,787 m (205,997 feet)*
Concrete mattress/rock armoring	8,656 m (28,398 feet)
Clamshell dredging/dragline burial	336 m (1,104 feet)
Horizontal directional drilling (HDD)	2394 m (7,854 feet)
Total length	74,174 m (243,353 feet)
Total length excluding HDD segments	71,780 m (235,499 feet)
Plowing/trenching / total non-HDD length	87%

Source: Port Dolphin 2008d

Note:

* Includes an estimated 23,316 m (76,500 feet) that might not achieve the design depth and could require concrete mattresses or rock armoring.

Approximately 6,225 acres of soft-bottom/sand habitat and approximately 3,026 acres of hard- and live-bottom habitat would be directly affected by installation of the Proposed Port and Route Alternative. Current data indicate seagrass beds are not present at the HDD exit location, but do occur 23 m (75 feet) to the southwest. Because seagrass beds are dynamic, a thorough seagrass survey would be conducted prior to construction to determine the current status and location of seagrass in the area of HDD exit location (Port Dolphin 2007b).

About 96 percent of the total impact area would be due to anchor sweep. Of the total hard- and live-bottom habitats affected, about 18 percent would be Type A (20 to 100 percent cover by attached epibentic biota or hard bottom with greater than or equal to 0.3 m (0.8 feet) in relief, inclusive of sand components), 51 percent Type B (5 to 20 percent cover by attached epibentic biota or hard bottom with greater than or equal to 0.3 m (0.8 feet) in relief, inclusive of sand components), and 31 percent Type D

(sand [soft substrate/sedimentary habitat] in proximity to reef/hard-bottom resources, a sandy veneer over a less than 5 percent epibenthic coverage). In areas of Type A and B habitats, the substrate, as well as the organisms attached to it, could be damaged by anchor cable sweep. In Type D areas, there would be no anchor cable damage to emergent hard substrate, as the cables are assumed to sweep the top few inches of the seafloor. However, depending on the thickness of the sand veneer, some organisms might be attached to the underlying hard substrate and could be dislodged by the anchor cable. Overall, the damage to hard- and live-bottom communities due to anchor sweep in Type D areas is considered less severe than impacts on Type A and B habitats.

Indirect impacts associated with plowing would result in the resuspension of coarse-grained sediments and result in resettled sediments (also known as a sediment drape) within immediately adjacent areas. Resettled sediments are considered an indirect seafloor disturbance. Impacts of sediment drape on soft bottom would be short-term. Impacts of sediment drape on hard bottom would be long-term. Inside Tampa Bay, tidal currents and winds are the predominant forcing mechanisms for distribution of sediments while offshore currents, parallel to the coast, drive the transport of suspended sediments. Turbidity modeling (SSFATE) indicates that, as a result, fast settling rates are expected and the coarse sediments along the pipeline route would remain close to the source of disturbance (ASA 2008). The maximum deposit thickness associated with plowing, which would account for burial of 87 percent of the pipeline is expected to range from 1 mm at approximately 300 meters from the source to approximately 5 mm at the source. The deposit thickness associated with the clamshell dredge, which would account for burial of less than 1 percent of the pipeline is expected to range from 0 to 2 mm (0 to 0.08 inches) up to 120 m (394 feet) from the source. The deposit thickness associated with the HDD excavation, is expected to range from 0 to 5 mm (0 to 0.20 inches) up to 180 m (591 feet) from the source. If drilling muds are accidentally discharged during HDD, deposition thickness would be less than 1 mm. The extent of the maximum deposit would be limited to a narrow line along the pipeline route for pipeline burial or to a small area around the excavation of the HDD exit holes.

Soft-bottom substrates and the associated benthic community could recover in days to weeks. Santos and Simon (1980) observed that recolonization of soft sediments in Tampa Bay was initiated in a month following disturbance. Therefore, direct and indirect impacts on soft bottom would be minor and short-term.

Impacts such as pile driving into hard bottom or the laying of pipelines and concrete mattresses on limestone outcroppings and other hard-bottom relief features would be permanent. The substrates that replace the limestone outcropping would be recolonized. If soft substrates replace hard bottom the new habitat would be replaced with opportunistic organisms. If hard substrate replaces hard bottom, the new substrate would be quickly recolonized with epifauna such as corals and sponges. However, given the slow growth rates of these species it would take several years for species composition and density to rebound to pre-construction levels. Additionally, the structural component of the habitat would be reduced because the biota such as corals, sponges, and algae provide structure for juvenile and adult fish and shellfish species in this low relief habitat (Auster and Langton 1998). Typically, invaded habitats have low natural diversity, including area of anthropogenic disturbance (Ray 2005). The introduced Asian green mussel and possibly an introduced tunicate have been identified along the pipeline route in Tampa Bay (Port Dolphin 2007d). These could recolonize disturbed hard bottom and possibly outcompete other hard-bottom species in disturbed areas (Ray 2005). In the offshore areas, patches of paddlegrass would be affected by trenching of the pipeline. Although patches of paddlegrass would be completely disturbed or uprooted, these impacts would not be long-term, or permanent. Paddlegrass is an annual seagrass species which regrows each year; therefore locations of paddlegrass areas are very dynamic in nature (Hammerstrom et al. 2006, Dawes and Lawrence 1989). Paddlegrasses would be impacted in depths of 12 to 15 m (40 to 50 feet). No direct impacts on inshore seagrass beds would be expected because the pipeline would be installed using HDD in this area. All seagrass beds, including all

species of submerged aquatic vegetation, are protected under Section 404 of the CWA. Therefore, mitigation for all impacts on seagrass or macroalgae would be required.

Seafloor disturbance could also occur as a result of resettling of suspended sediments during installation and construction of the Proposed Port Site and Route Alternative. Redeposited sediments would potentially reduce viability of demersal fish eggs, growth and reproduction of benthic organisms, and survival rates of benthic organisms. In extreme cases, resettled sediments could smother benthic organisms, although many benthic invertebrates would be able to burrow vertically through resettled sediments (Berry et al. 2003). Redeposited sediments could also cover macroalgae and seagrass beds, causing a reduction in photosynthesis and possible mortality to these species as well. Effects of burial are dependent on sediment type, depth of sediment, and the size and behavior of infaunal or epifaunal organisms (including the species' ability to burrow and species' mobility) (SCDNR 1995). In laboratory experiments, most estuarine infaunal species were able to survive burial to depths of 20 cm (7.8 inches) or more. Epifaunal or sessile species (organisms attached to the substrate) suffer higher mortality rates after burial however (SCDNR 1995). Macrofaunal assemblages living deep 2 to 15 cm (0.79 to 5.9 inches) within the sediment were generally slower to recover than those found in the top 2 cm (0.79 inches) (Thrush et al. 2003). Mortality during sedimentation has been found to depend on a species' ability to burrow through redeposited sediments and the rate at which sediment is deposited (IMG 2004). High levels of sedimentation could also impact hard bottom by reducing colonization of hard-bottom organisms by covering potential substrate and burying newly settled juveniles (IMG 2004). Areas where hard bottom is replaced by soft sediments are expected to be recolonized by more opportunistic species, such as polychaetes. Santos and Simon (1980) indicate that in the Tampa Bay region, initial colonizers following natural and artificial defaunations include polychaetes such as *Streblospio benedicti*, *Mediomastus californiensis*, *Diopatrea cuprea*, *Nereis succinea*, *Gyptis vittata*, and *Parahesione vittata*; mollusks such as *Mulinia lateralis*; turbellaria (a class of flatworms) such as *Stylochus* sp.; various Harpactacoid copepods; various amphipods; and various cumaceans. Invasive species could also colonize areas where hard bottom has been replaced by soft bottom. Typically, invaded habitats, including areas of anthropogenic disturbance, have low natural diversity (Ray 2005). The introduced Asian green mussel and possibly an introduced tunicate have been identified along the pipeline route in Tampa Bay (Port Dolphin 2007d). These could recolonize disturbed hard bottom and possibly outcompete other hard-bottom species in disturbed areas (Ray 2005).

The maximum expected deposit thickness associated is 5 mm (depending on the pipeline burial method). Sediment thickness tapers off to less than 2 mm within about 50 to 200 m (164 to 656 feet) from the source for most of the seafloor deposits. While the total area receiving sediment deposits of 2-mm thickness could be several times greater than the area directly affected by trenching as noted above, the areas receiving the thickest accumulations would be close to the trench—essentially the same areas directly affected by the plowing or dredging per se. These are predominantly soft-bottom areas since such areas are amenable to plowing or dredging. No measurable sediment accumulation on seagrasses is predicted (Port Dolphin 2008a). As stated above, seagrass beds are dynamic and a thorough seagrass survey would be conducted prior to construction to determine the current status and location of seagrass both in deeper waters and in the area of HDD exit location (Port Dolphin 2007b). In areas that cannot be plowed, the pipeline would be covered with concrete mattresses (or similar armoring). The width of seafloor affected by mattresses is estimated to be 4 m (13 feet). Approximately 5.2 hectares (13 acres) would be affected by concrete mattresses. About 44 percent would be hard- and live-bottom habitats, and the remaining 56 percent would be soft bottom. In hard- and live-bottom areas, the result would be replacement of the natural hard substrate by a low-relief, relatively smooth concrete covering. The mattresses are expected to eventually be colonized by epibiota and fishes. The mattresses or other armoring would not mimic the complex physical structure of the original hard substrate. The climax community on the artificial substrate would not match the hard bottom it replaces. However, the material would be similar to artificial reefs that have been constructed in various areas including the west Florida

shelf (Dodrill 2007). The impacts from sediment deposition resulting from pipeline construction on hard-bottom communities would be minor, short-term, and adverse.

Concrete mattresses would also be placed in some soft-bottom areas (e.g., where plowing is not feasible due to curvature of the route). In these areas, the existing soft-bottom substrate would be replaced with an artificial hard substrate. The existing soft-bottom benthic community at those locations would be crushed or buried.

Predicting recovery times of benthic communities following disturbance is complex and depends on (1) the timing, severity, and frequency of the impact; (2) the complexity of the habitat and the organisms that are being disturbed; and (3) the energy of the environment (Auster and Langton 1998). In soft-bottom/sand habitat, displaced organisms would return shortly after construction ceased, and disrupted communities would easily recolonize from surrounding communities of similar organisms. Santos and Simon (1980) observed that recolonization of soft sediments in Tampa Bay was initiated in a month following disturbance. The recovery of hard- and live-bottom habitat is expected to take longer, because it is a more complex community (Auster and Langton 1998). Hard-bottom assemblages in the area are composed of algae, sponges, scleractinian corals, octocorals, hydrozoans, and other sessile organisms. Most epifaunal groups colonize disturbed or newly open hard-bottom areas by settlement of planktonic larvae. Thus, the assembly of organisms on newly exposed hard-bottom areas can be highly variable and depend on life history characteristics of individual species coupled with local circulation patterns.

While recolonization usually begins soon after dredging ends, the process can range in duration from a few months for shallow dredging to years or decades (the latter for deep pits created by dredging borrow areas, which would not be relevant here). Recovery of soft-bottom communities in and along the pipeline trench would likely be faster than indicated by most studies of dredging impacts. Unlike typical dredging sites, the trench itself would be only 20.4 m (66.9 feet) wide, backfilled after being dredged, and accessible for recolonization from adjacent soft-bottom areas to either side all along its length.

In cases where hard-bottom habitat is converted to soft-bottom habitat due to sediment redeposition, a long-term shift in community structure would occur. Epifaunal species associated with hard bottom would be buried and infaunal species would recruit the soft-bottom habitat. In areas where hard-bottom habitat is being replaced by less complex hard structure of the Port, pipeline, and concrete mattresses, mobile organisms would be temporarily displaced from existing shelter, thereby exposing them to increased predation. Sessile organisms such as corals and sponges would be crushed. Similar organisms would recolonize the new hard-bottom habitat; however, because of the slow growth rates of these species, it would take up to several years for species composition and density to recover to pre-construction numbers.

In summary, short-term and long-term, minor to moderate, direct and indirect, adverse impacts on benthic communities would occur as a result of seafloor disturbance associated with construction.

Proper design and implementation of BMPs and mitigation would minimize impacts on benthic resources from seafloor disturbance from the construction of the pipeline.

Turbidity. Turbidity increases would cause mobile benthic organisms to temporarily disperse from or avoid the construction areas. However, displaced benthic infaunal organisms would likely recolonize the disturbed area within days after construction ceased (MMS 2002b). Direct impacts on sessile organisms would include abrasion; clogging or obstruction of respiratory organs and filter-feeding appendages; and interference with feeding, growth, or respiration (Berry et al. 2003). In extreme cases, resettled sediments could smother benthic organisms, although many benthic invertebrates would be able to burrow vertically

through resettled sediments (Berry et al. 2003). Increases in turbidity could also reduce photosynthesis of macroalgae and seagrasses.

Indirect impacts on benthic organisms, seagrasses, and macroalgae would be associated primarily with light attenuation caused by suspended sediment particles. This, in turn, could affect the feeding efficiency and behavior (e.g., avoidance of predators) of benthic organisms, or alter habitat by changing substrate composition. Increases in turbidity could cause a decrease in photosynthesis in macroalgae and seagrasses. Either of these impacts could change the distribution of infaunal and epifaunal species (Berry et al. 2003). In addition, reduced water clarity could inhibit the feeding success of visual predators (Colby and Hoss 2004). Benthic invertebrates can tolerate elevated concentrations of suspended particulates for short periods of time (days) without suffering acute effects (USACE 2001). Chronic effects such as decreased growth, weight loss, and increased mortality can occur from low sediment levels during longer time periods. However, turbidity modeling indicates that turbidity plumes would be short-lived (settle to close to background levels within 5 hours) and remain fairly close to their source. Therefore, adverse impacts on benthic resources would be minor.

The extent of hard and live bottom exposed to turbidity from plowing and dredging can be roughly estimated by assuming that the plume typically would extend about 150 m (492 feet) to each side of the pipeline. Using a plume width of 300 m (984 feet) and a total length of 63,124 m (207,101 feet) for the plowable and dredgeable segments of the pipeline, the total plume area would be 18,937,200 square meters (203,838,324 square feet) or 1,894 hectares (4,679 acres). Habitats along the plowable portion of the route are 65 percent soft bottom, 5 percent Habitat Type A, 12 percent Habitat Type B, and 18 percent Habitat Type D. Multiplying the total plume area by the percentage of each habitat type yields an impact area of 1,240 hectares (3,064 acres) of soft bottom, 94 hectares (231 acres) of Habitat Type A, 229 hectares (566 acres) on Habitat Type B, and 331 hectares (819 acres) on Habitat Type D (see **Table 4.2-14** for the area of each habitat type along the plowable portions of the pipeline route) (Port Dolphin 2008d).

Turbidity modeling predicts that sediment resuspended by plowing would not reach seagrass beds near the landfall. However, resuspended sediment from HDD pit excavation would reach seagrass beds south of the HDD pit. The seagrass beds would be exposed to suspended sediment levels of 0 to 5 mg/L and the total area of seagrasses affected would be 0.78 hectares (1.93 acres). However, no measurable sediment accumulation on seagrasses is predicted (Port Dolphin 2008a). As stated above, seagrass beds are dynamic, and a thorough seagrass survey would be conducted prior to construction to determine the current status and location of seagrass in the area of HDD exit location (Port Dolphin 2007b).

In summary, short-term, moderate, direct and indirect, adverse impacts on benthic resources would be expected to occur as a result of turbidity increases associated with construction.

BMPs are expected to be effective in reducing the magnitude and extent of impacts resulting from sediment suspension during pipeline construction and therefore, the impact of turbidity on benthic resources. However, the performance of the measures should be monitored during construction to verify their effectiveness. The Applicant has stated the intention to apply for a variance from turbidity standards; if granted, this could result in an increase in adverse impacts on benthic resources.

Lighting. The Applicant has committed to using downshielding on lights used to identify construction vessels and illuminate working decks. Further, lighting on construction vessels would not illuminate surrounding waters. Additionally, during installation an environmental coordinator would be on site to ensure no violations would occur. Therefore, no impacts on benthic resources would be associated with lighting used during construction.

Operations

Seafloor Disturbance. Long-term seafloor disturbance would occur as a result of placement of fixed parts of the buoy system, concrete mattresses, or other protective cover where the pipeline cannot be buried, long-term chain and riser scour, and resettling of suspended sediments associated with the chain and riser sweep.

Table 4.2-14 presents an estimate of the area of each habitat type that would be impacted by the operation of the proposed Port. In areas where soft bottom/sand is replaced by hard components such as concrete mattresses, and anchors/piles associated with the buoy, a shift in associated benthic assemblages could occur. This impact would be beneficial for species that prefer hard-bottom structure and adverse for species that prefer soft sediment. In areas where anchors/piles are placed in Type B (see definition in **Table 4.2-14**) hard-bottom habitat, the anchors/piles are expected to be colonized by organisms from the surrounding habitat (Auster and Langton 1998). Long-term impacts on the natural hard-bottom relief would result during pile driving.

Additional long-term disturbance (approximately 22 acres) would be caused by the sweeping and scouring of benthic substrate by anchor chains and cables. In soft-bottom areas (approximately 16 acres), anchor and riser sweep could cut through the top few inches of the sediment layer, adversely impacting fauna such as tube-dwelling polychaetes, anemones, and other large infauna. In hard-bottom areas (approximately 6 acres), anchors and risers would scrape the surface of limestone outcropping, impacting various epifaunal species. Turbidity modeling indicates that in the immediate vicinity of the proposed Port, sediments would continually be resuspended and resettle. It is unlikely that this area would be successfully recolonized by motile or sessile benthic organisms. Considering the abundance of soft-bottom habitat available in the region, the intensity of potential impacts, impacts on soft-bottom/sand communities would be long-term, minor, direct, and adverse. Impacts on hard-bottom habitat in Type B hard- and live-bottom habitat would be long-term, moderate, direct, and adverse. The importance of this habitat to commercial and recreational fish and shellfish species is presented in **Section 3.2.9**. A characterization of the commercial and recreational fish and shellfish species, and commercial and recreational fisheries in the area is presented in **Section 3.2.9**.

In summary, long-term, minor to moderate, direct, adverse, beneficial impacts on benthic communities would occur as a result of seafloor disturbance associated with the operations of the proposed Port.

Turbidity. Turbidity associated with long-term chain scour is expected to be extremely localized. This area is not expected to recolonize because of long-term chain scour. Turbidity could spread from the immediate area of the proposed Port and affect different areas depending on the currents. The maximum distance a turbidity plume of 100 mg/L is expected to travel from a source is 150 m (492 feet) (ASA 2008). The chronic effects of turbidity on benthic resources in a larger area surrounding the proposed Port would be expected to be minor.

Long-term, moderate, direct and indirect, adverse impacts on benthic resources would be expected to occur as a result of turbidity increases associated with long-term chain-and-riser sweep.

Seawater Intake and Cooling Water Discharge. Modeling of the cooling water discharge plume indicates that the plume would surface and would not impinge the seafloor. No impacts on benthic resources would be expected to occur as a result of seawater intake or cooling water discharges associated with Port operations.

Other Routine Discharges. Cooling water discharges and testing of the firefighting system would comply with NPDES permit conditions. While SRVs are present at the Port, they would not discharge

domestic waste, bilge water, or ballast water. In addition, on the SRVs, gutter bars would be replaced around equipment where oil leaks could occur (e.g., mooring winches, cranes). Rain water from these areas would be drained to a bilge holding tank. No rain water would be discharged overboard, from areas around equipment where oil leaks would occur, while at the buoy. The firewater system discharges consist of uncontaminated seawater from testing the firefighting system on the SRVs. Based on the infrequent nature of the discharge, its short duration, and the lack of contaminants, impacts on benthic resources would be expected to be long-term, minor, direct, and adverse. Proposed BMPs (see **Section 4.11**) would help reduce the impact of routine vessel discharges on benthic resources.

Marine Debris. The discharge and disposal of garbage and other solid debris from vessels by lessees is prohibited by the MMS (30 CFR 250.300) and the USCG (MARPOL Annex V, Public Law 100-220 [Statute 1458]) (33 CFR Part 151). The discharge of plastics, including ashes from burned plastics, is strictly prohibited and is therefore never authorized. All plastics must be returned to shore, and are tracked. These prohibitions on the discharge and disposal of garbage and other solid debris from vessels would be incorporated as enforceable conditions into the DWPA license. The USCG enforces MARPOL and the Deepwater Port License and fines or penalties could be assessed where laws and regulations are violated. Therefore, long-term, minor, direct and indirect, adverse impacts on benthic resources would be expected to occur as a result of the discharge of marine debris, should this occur.

Although the intentional discharge of marine debris is prohibited by law, discharges associated with offshore structures do occur and sinking marine debris could also have long-term direct impacts on benthic resources, by altering substrate composition, interfering with dissolved gas exchange between sediment pore waters, and releasing heavy metals and other toxic substances. Long-term, minor, direct, adverse impacts on benthic resources would be expected to occur as a result of marine debris.

Hydrocarbon Spills. The impacts of hydrocarbons on benthic resources would be caused by either the physical nature of the oil (physical contamination and smothering) or by its chemical components (toxic effects and bioaccumulation). The impacts would depend on the depth of the oil spill and the type of oil spilled. It is likely that oil spills at the surface would tend not to sink below depths of 20 m (35 feet) (MMS 2002a, 2002b). When oil sinks to depths around 20 m (35 feet), it is at concentrations several orders of magnitude lower than those demonstrated to have an effect on marine organisms (MMS 2002b). Because the Project area is approximately 30 m (100 feet) above the seafloor, a hydrocarbon spill from an SRV would not impact the benthos. However, benthic communities could be indirectly affected by clean-up operations or through physical damage to the habitats in which plants and animals live. Indirect, adverse, minor, and short-term and long-term impacts on benthic resources are expected to result from hydrocarbon spills. Applicant proposed BMPs (see **Section 4.11**) would both help to avoid and reduce the impacts of hydrocarbon spills, which would reduce potential impacts on federally managed fish and shellfish.

Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and

abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

These activities would cause localized removal, turnover, and disruption of sediments, which could potentially displace, bury, or crush benthic organisms primarily in the offshore areas of the Project and at each end of the pipeline. No explosives would be used for decommissioning. Habitat structures could also be temporarily disturbed. The total area of each type of benthic habitat affected by decommissioning is presented in **Table 4.2-14**.

Displaced organisms would likely return to the area shortly after decommissioning activities ceased. Due to the ubiquitous nature of the region's benthic communities, affected benthic assemblages would be expected to recover by recruitment from surrounding communities of similar organisms. As a result, short-term, minor, direct, adverse impacts on benthic communities would occur during Project decommissioning.

4.2.1.6.2 Alternatives

Table 4.2-16 compares impacts from the Proposed Action to each of the alternatives with respect to benthic resources. There are limited quantitative benthic data available for the alternative pipeline routes. Comparisons in **Table 4.2-16** were made based on publicly available resource maps.

Southern Site and Route Alternative. The impacts on benthic resources associated with construction, operation, and decommissioning under the Southern Site Route Alternative would be similar to those under the Proposed Action based on limited available data. However, impacts on offshore seagrasses and macroalgae would be greater under this alternative. Impacts associated with turbidity would be slightly greater because the pipeline route would be longer.

Offshore Interconnection with Gulfstream Pipeline Alternative. Impacts on benthic resources would be less than the Proposed Action under this alternative. Under this alternative the pipeline would not come inshore because of the connection to the Gulfstream pipeline. The connection would occur approximately 16 km (10 mi) from the mouth of Tampa Bay, in water depth of 20 feet. Turbidity associated with pipeline installation would be less under this alternative.

FSRU Port Design Alternatives. Construction, operation, and decommissioning impacts on benthic resources under the FSRU Port Design Alternative would be similar, but slightly less than those under the Proposed Action. Under this alternative there would be fewer anchors and, therefore, less seafloor disturbance and turbidity.

AAV Alternative. Construction, operation, and decommissioning impacts on benthic resources under the AAV Alternative would be similar to those under the Proposed Action.

Suction Piles Anchoring Alternative. Construction, operation, and decommissioning impacts on benthic resources under the Suction Piles Anchoring Alternative would be similar to those under the Proposed Action.

No Action Alternative. The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No

Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, no direct or indirect impacts on benthic resources would be expected. Alternative sources of natural gas might include other Deepwater LNG Ports or onshore LNG terminals. Other Deepwater LNG Ports might have impacts on benthic resources that are similar to the Port Dolphin system but in a different geographic location and therefore on different species and habitat types.

Table 4.2-16. Benthic Resources Impact Summary

Impact	Proposed Action	Southern Site and Route Alternative	Offshore Interconnect Alternative	FSRU Design Alternative
Pipeline construction	Minor to moderate, short-term, adverse impacts along pipeline route as a result of seafloor disturbance and turbidity. Long-term impacts due to loss of habitat as a result of seafloor disturbance.	Short-term impacts higher than Proposed Action (longer route).	Short-term impacts lower than Proposed Action (shorter route).	No difference from Proposed Action.
Port construction	Moderate, short-term and long-term, adverse impacts in the vicinity of the Port as a result of seafloor disturbance and turbidity.	No difference from Proposed Action.	No difference from Proposed Action.	Short-term impacts would be similar to the Proposed Action, with a slightly less impact, there would be fewer anchors and less turbidity.
Operation of Port	Minor to moderate, long-term, adverse impacts due to chain sweep, routine discharges, marine debris, and potential LNG/hydrocarbon spills.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.
Decommission of Port	Minor, short-term adverse impact would be similar to construction of the pipeline and port. Impacts of decommissioning would be lower than construction.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.

Notes:

1. Under the No Action Alternative none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur. No direct or indirect impacts on biological resources would be anticipated.
2. The AAV and Suction Pile Anchoring Alternatives were carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.2.1.7 Nonthreatened and Nonendangered Marine Mammals

4.2.1.7.1 Proposed Action

As noted in **Section 3.2.6**, based on available survey data, only the bottlenose dolphin, Atlantic spotted dolphin, and rough-toothed dolphin occur on the continental shelf in the eastern GOM (Fulling et al. 2003). Analyses of potential impacts of the Proposed Action are directed to those species.

Construction

Seafloor Disturbance. Installation of Port components and pipelines would temporarily disrupt benthic habitat in the immediate vicinity of the construction areas. Removal of bottom habitat, along with resident benthic organisms within the area, affects not only the benthic communities, but also the fish assemblages that rely on the benthos and seagrasses for food, which in turn are preyed upon by marine mammals. Once the disturbance ceases, the substrate would be available for recruitment of benthic organisms. Reestablishment of a benthic community similar to that in adjacent areas is expected to take a period of weeks to several years. This is based on studies of fishing gear impacts on the seafloor and associated habitat changes (Auster and Langton 1998). Nonendangered and nonthreatened marine mammals could be indirectly impacted if benthic prey species were displaced or destroyed by construction activities. Affected species would be expected to recover soon after construction ceased, and would represent only a small portion of food available to marine mammals in the area. Short-term, minor, indirect, adverse impacts on nonendangered and nonthreatened marine mammals could occur as a result of seafloor disturbance caused during construction. The potential for adverse impacts on seagrasses would be reduced with use of the BMPs and the Project-specific Wetland and Waterbody Construction and Mitigation Procedures Plan (see **Section 4.11**).

Turbidity. The main source of water quality impacts would be pipeline trenching, which would produce turbidity along the pipeline route. Sources of turbidity include pipeline burial, as well as anchoring of the lay barge, placement of the pipeline and mattresses, and HDD of the shore approach. The clamshell dredge method to be used during the Proposed Action is expected to produce much less turbidity than jetting (ASA 2008). As indicated in **Section 4.1.1**, turbidity modeling (SSFATE) conducted by the Applicant was used to estimate the area in which sediment concentrations would continue to exceed 100 mg/L after 30 minutes. Under worst-case conditions, is estimated that sediment concentration would exceed 100 mg/L for less than 2 hours (ASA 2008). Turbidity modeling indicates that both turbidity plumes would be short-lived and remain fairly close to their source (ASA 2008). The total areal extent of the turbidity plumes created during pipeline installation is estimated to be approximately 1,894 hectares (4,679 acres) (ASA 2008). However, the actual distance from the source would depend on the source (e.g., HDD, dredge) and prevailing conditions (e.g., weather and tide).

Impacts on nonendangered and nonthreatened marine mammals would be indirect, due to any impacts on finfish and invertebrates that are prey for dolphins. Resuspended sediments can obstruct gills of fish, as well as cause behavioral responses by the fish to the turbidity (Anchor Environmental 2003). Water turbidity appears to have little or no direct impact on dolphins, in particular, bottlenose dolphins that occur within Tampa Bay as well as coastal waters, as they are sighted in both clear and muddy waters. Suspended sediments in the water column reduce light availability and, therefore, seagrass production. Seagrass beds serve as habitat for fish species important to dolphins. Dolphins could be indirectly impacted as a result of any hazardous substances in sediment being resuspended and bioaccumulated in food items from contaminated suspended sediments. Short-term, minor, indirect, adverse impacts on nonendangered and nonthreatened marine mammals could occur as a result of temporary turbidity increases caused by construction.

Hydrostatic Test Water Intake and Discharges. During the construction phase, seawater would be used for hydrostatic testing of the offshore pipeline and flowlines. Hydrostatic testing is a one-time temporary event that would require filling the pipeline twice. The seawater would be taken onboard a marine vessel at five locations along the route. To assist in leak detection during testing, an environmentally benign dye, Hydro Tag Green Fluorescent Dye, would be added to the flooding and test water. HydroHib P would be added as a corrosion inhibitor; it is widely used in the offshore pipeline industry and has been approved by the USEPA and certified by USEPA-approved laboratories. HydroHib P requires no neutralization and the treated water can be discharged into the sea (subsea) through specially designed diffusers. This is intended to release the treated seawater into a larger volume of water than if diffusers were not used. As the test water is released to the sea, the concentration would be immediately diluted well below the toxicity limit via the diffusers, thereby further rendering the test water as uninhibited or "Non-Toxic." The hydrostatic test water discharge would occur offshore from a marine vessel at one of the STL buoy locations rather than at Port Manatee. No water quality impacts are expected from the water additives.

Hydrostatic integrity testing might indirectly impact nonthreatened and nonendangered marine mammals, since plankton species could be entrained and subsequently killed by the seawater intake system. Plankton mortality could indirectly impact invertebrate and fish populations that feed on plankton. Hydrostatic integrity testing would indirectly impact marine mammals, since plankton species (including fish larvae and eggs) could be entrained and subsequently killed by the seawater intake system. Marine mammals feed on invertebrate and fish populations that either feed on different types of plankton or on more mature individuals of the affected ichthyoplankton species. Filtered seawater would be used for the hydrotesting. Considering the overall amount of plankton available in the area, these impacts would be short-term and minor. As stated in **Section 4.1.1,** hydrostatic testing would have a short-term, minor, localized impact on water quality. Therefore, short-term, negligible, localized impacts on phytoplankton would occur as a result of hydrostatic testing

Vessel Traffic. Construction activities, associated with the Proposed Action, would result in increased vessel traffic in the Tampa Bay region. As specified by the Applicant, approximately 1,800 total vessel trips would be required during construction as shown in **Table 4.10-1** (Port Dolphin 2008a). Please see **Section 4.10.1** for more information on construction vessel traffic. Twelve types of vessels might be used during construction (weather contingent); the supply vessel (360 to 600 total trips) and material barges (720 to 900 total trips) represent the most frequent vessel movements. Frequency of vessel movements ranges from 2 trips per year for jack-up and dragline barges to approximately 900 trips per year for material barges. Expected vessel traffic during construction would consist of approximately 1,796 trips over the 11-month construction period. Approximately 125,000 boats were registered in Manatee, Hillsborough, and Pinellas counties in 2006, of which approximately 2,800 are considered commercial and include charter vessels and commercial fishing vessels (HSMV 2005). From a broader perspective, upwards of 1,000 commercial vessels pass through the Straits of Florida daily, and there are tens of thousands of vessel transits annually in the GOM. The worldwide commercial fleet was estimated to include at least 81,867 vessels in 1999 and is reportedly increasing at about 12 percent per year (NRC 2003). Vessel traffic could affect marine mammals by direct collisions with vessels, wave action from boat wakes, noise (which might cause behavioral disturbance), and accidental hydrocarbon spills. Potential impacts of noise from vessel traffic are discussed in the next section (entitled *Noise*). Increased vessel traffic is likely to increase petroleum hydrocarbons discharged into the water; those possible impacts are discussed in the marine mammal sections regarding *Hydrocarbon Spills*.

Dolphins are commonly attracted to moving vessels and spend periods of time following these vessels or swimming within the bow waves of ships traveling at high speeds. It is generally considered that because these species are agile, powerful swimmers, they should be capable of avoiding collisions with oncoming vessels, however, this is not always the case. As noted in a worldwide review by Van Waerebeek et al.

(2007), small-boat propellers have long been recognized as a cause of traumas in bottlenose dolphins and Atlantic spotted dolphins. It is known that bottlenose dolphins in Tampa Bay are occasionally struck by vessels (Wells and Scott 1997). It is not improbable to assume that rough-toothed dolphins too have been victims of vessel collisions; these likely have not been reported or published. Such injuries might or might not be lethal, and are believed to be uncommon and not result in population-level effects. Nonlethal injuries can reduce the breeding success of individuals and could permanently remove some animals from the breeding population (Hubard and Swartz 2002). Vessel traffic that disturbs dolphins could cause them to leave preferred habitats and could alter biologically important behaviors such as feeding, nursing, or resting (Hubard and Swartz 2002).

Short-term, minor, direct, and adverse impacts on nonthreatened and nonendangered marine mammals could occur as a result of increased vessel traffic during construction (without mitigation and monitoring). *MMS NTL No. 2007-G04, Vessel Strike Avoidance and Injured/Dead Protected Species Reporting*, is designed to mitigate impacts on nonthreatened and nonendangered marine mammals, and has been adopted as a mitigation measure for the Proposed Action. In addition, project-related vessel traffic increases would be very small in comparison with existing vessel traffic in the area (see **Section 4.10**). Therefore vessel traffic associated with the Proposed Action would be expected to have minor impacts on non-threatened and non-endangered marine mammals. Applicant-proposed BMPs and minimization measures to avoid or reduce impacts of vessel traffic and noise on marine mammals are found in **Section 4.11**.

Indirect effects from increased vessel traffic include increased wave action due to vessel wakes and scarring of seagrass beds by propellers (EPC 2007). Seagrasses are important habitat for dolphin prey (for more information, see section on fish). Wakes affect seagrass beds by the increase of wave action, which could play a role in the decline of longshore sandbars that help protect seagrasses (Lewis 2002), as well as increased turbidity that, as noted earlier, reduces light availability and, therefore, seagrass production. The potential for adverse impacts on seagrasses would be reduced with the use of BMPs and the Project-specific Wetland and Waterbody Construction and Mitigation Procedures Plan (see **Section 4.11**). The plan would be developed in coordination with appropriate regulatory agencies and implemented prior to and during construction activities.

Noise. Short-term, minor, direct, adverse impacts on nonendangered and nonthreatened marine mammals could occur as a result of noise generated by pile driving, construction vessels, and machinery. Nonendangered and nonthreatened marine mammal hearing capabilities are described in **Section 3.2.6.** Background information on noise impacts on marine mammals and acoustic criteria can be found in **Section 4.2.1.2.1**, discussed in detail under *noise* in *construction impacts*.

Bottlenose dolphins are common in nearshore areas associated with the Proposed Action. While Atlantic spotted dolphins are common in the GOM, the species is not commonly seen in the Tampa Bay area, and tend to be sighted farther from the coast (Griffin and Griffin 2003). Tagging and sighting data document occurrence of the rough-toothed dolphin in waters over the continental shelf off the Gulf Coast of Florida (e.g., Wells et al. 1999, Fulling et al. 2003). The functional hearing range for odontocetes, such as the bottlenose dolphin and Atlantic spotted dolphin, has generally been estimated to lie between 150 Hz and 160 kHz. However, within this range, dolphins are thought to hear best between 20 and 90 kHz (i.e., they are mid-frequency hearing cetaceans) (Nachtigall et al. 2003).

The noise associated with construction would be broadband (including low and high frequencies) noise (JASCO 2008) and most marine mammals present would be capable of hearing it. Most noise would be short-term in duration and moderate in intensity. Noise from pipeline construction activities is not expected to be higher than other underwater noise construction activities near Tampa Bay. Pile-driving noise would be the loudest noise associated with construction. **Table 4.2-17** presents the distance from

noise sources that Level A and Level B harassment of dolphins (mid-frequency cetaceans), could occur for offshore construction activities. **Table 4.2-18** presents the distance from noise sources that Level A and Level B harassment of dolphins (mid-frequency cetaceans), could occur for inshore construction activities. As described in **Section 4.2.1.2.1,** Level A harassment has an exposure criterion of 180 dB re 1 μPa^2-s. Behavioral disturbance criteria for impulse/intermittent sounds is set at a sound pressure level (SPL) value of 160 dB re 1 µPa at 1m and 120 dB re 1 µPa at 1m for continuous noise (70 FR 18871-18875). Additional details on noise criteria and noise types are presented in **Section 4.2.1.2.1.**

The Applicant has estimated that the highest noise levels exceed Level A and B harassment thresholds; however, minimization measures proposed by the Applicant and mitigation measures recommended by agencies (see **Section 4.11**), are anticipated to reduce impacts on ambient noise levels and avoid impacts on non-threatened and non-endangered marine mammals. Implementation of these measures is considered to reduce the likelihood of exposure and potential effects on marine mammals within the zone of influence; however, it is not known whether these measures would reduce noise levels to below

Table 4.2-17. Distance from Broadband Noise Sources Associated with Construction that Level A and Level B Harassment of Nonthreatened and Nonendangered Marine Mammals Could Occur

	Buoy Installation (distance from source)	Pile Driving (distance from source)	Pipe Laying (distance from source)	Pipe Burial (distance from source)
Mid-Frequency Hearing Cetaceans				
Level A	< 1 m	1 to 10 m	< 20 m	< 20 m
Level B	< 20 m to 2.9 km	10 m to 3.1 km	20 m to 6.8 km	20 m to 7.9 km

Source: JASCO 2008
Notes:
Level A harassment: intensities above 180 dB re 1 µPa at 1 m RMS.
Level B harassment (impulse noises): intensities above 160 dB re 1 µPa at 1 m RMS.
Level B harassment (continuous noises): intensities above 120 dB re 1 µPa at 1 m RMS.

Table 4.2-18. Distance from Broadband Noise Sources that Level A and Level B Harassment of Nonthreatened and Nonendangered Marine Mammals Could Occur for Offshore Construction Activities

	Pile Driving (distance from source)	Pipe Laying: Passage Key (distance from source)	Pipe Laying: Tampa Bay (distance from source)	Pipe Burial: Tampa Bay (distance from source)
Mid-Frequency Hearing Cetaceans				
Level A	4 to 20 m	< 20 m	< 20 m	< 20 m
Level B	20 m to 1.7 km	20 m to 1.5 km	20 m to 5.9 km	20 m to 6.6 km

Source: JASCO 2008
Notes:
Level A harassment: intensities above 180 dB re 1 µPa at 1 m RMS.
Level B harassment (impulse noises): intensities above 160 dB re 1 µPa at 1 m RMS.
Level B harassment (continuous noises): intensities above 120 dB re 1 µPa at 1 m RMS.

Level A or Level B thresholds. While the effectiveness of individual measures has not been studied, they are standard measures requested by the NMFS (and USFWS) in a variety of acoustic disturbance projects (e.g., seismic surveys, Navy training exercises, pile-driving exercises, other LNG projects). These measures are widely accepted in the scientific and regulatory community to protect and minimize effects on marine mammals. It is anticipated that short-term (approximately 2 weeks), direct, adverse effects on marine mammals would be potentially moderate to potentially major because of the uncertainty of effectiveness of proposed measures to reduce noise impacts.

Continuous noise created by construction vessels could potentially mask sounds produced and received by marine mammals. Masking occurs when underwater noise interferes with an animal's ability to hear other concurrent sounds such as conspecifics, or predators. This could, in turn, affect an animal's ability to feed, mate, or travel efficiently and safely through an environment. While no data exist for the specific area associated with the Proposed Action, Phillips et al. (2006) found that ambient noise measurements near the mouth of the Crystal River, approximately 130 km (81 mi) north of the Proposed Action area, were 105 dB. While one cannot quantifiably analyze the noise levels specifically in the Proposed Action area, one can assume that the ambient noise levels would increase. However, based on acoustic analyses performed off the northeastern United States using similar equipment and construction techniques, the transient nature and short-term duration of construction vessel noise would reduce the potential for masking to occur (LGL and JASCO 2005). In general, marine mammal exposure to construction vessel noise would only occur for a finite period of time and would not be expected to have long-term population-level impacts on marine mammals.

Dolphins show tolerance of the noise associated with floating and bottom-founded drill-rigs (Richardson et al. 1995). Dolphins TTSs greater than 10 dB were measured during exposures at 179 dB re 1 μPa for 47 to 54 minutes. Hearing sensitivity recovered within 45 minutes after sound exposure (Nachtigall et al. 2003).

Noise from vehicle traffic associated with construction is expected to be similar to other traffic currently in the area of the Project. Noise from pipeline construction activities is not expected to be substantially higher than other underwater noise construction activities near Tampa Bay. Pile-driving noise would be higher than other noise from construction. As noted earlier, monitoring efforts and mitigation measures designed to address acoustic disturbance to marine mammals are anticipated to reduce potential adverse noise impacts to marine mammals.

Dolphins can tolerate boats of all sizes, often approaching and riding the bow or stern waves or showing avoidance behavior linked to previous boat-based harassment (Shane et al. 1986; Richardson et al. 1995). Coastal bottlenose dolphins that are the object of whale-watching activities have been observed to swim erratically (Acevedo 1991), remain submerged for longer periods of time, display less cohesiveness among group members, whistle more frequently, and less often rest when boats are nearby (Janik and Thompson 1996, Nowacek et al. 2001, Buckstaff 2004, Constantine et al. 2004).

Entanglement. Marine mammals could be entangled by anchors, anchor lines, or buoy lines, but the potential for such an event would be low. Long-term, minor, direct and indirect, adverse impacts on nonthreatened and nonendangered marine mammals could occur due to the increased risk of entanglement during routine Port operations.

Lighting. Short-term, minor, direct and indirect, adverse impacts on nonthreatened and nonendangered marine mammals could occur as a result of lights used during construction. Construction activities would take place 24 hours per day, 7 days per week, during the installation period. For identification and safety purposes, construction and support vessels would be required to display lights when operating at night. The use of vessel lights during construction would be short-term, temporary, and transient. All lights

would be installed and used in accordance with NMFS and USFWS guidelines designed to reduce impacts on marine mammals. Additionally, during installation an environmental coordinator would be on-site to ensure no violations would occur. This would decrease attraction by fish and invertebrates to the area, as well as marine mammals that might be attracted by their presence, thereby reducing the vulnerability of ESA-listed marine mammals to possible disorientation, vessel strikes, noise, predation, and entanglement. Short-term, minor, direct and indirect, adverse impacts on marine mammals could occur as a result of lights used during construction.

Marine Debris. Both entanglement in and ingestion of debris have caused the death of or serious injury to marine mammals (Laist 1997). The discharge and disposal of garbage and other solid debris from vessels by lessees is prohibited by the MMS (30 CFR 250.300) and the USCG (MARPOL Annex V, Public Law 100-220 [Statute 1458]) (33 CFR Part 151). *MMS NTL No. 2007-G03, Marine Trash and Debris Awareness and Elimination*, is designed to mitigate impacts of marine debris. The discharge of plastics, including ashes from burned plastics, is strictly prohibited and is therefore never authorized. All plastics must be returned to shore, and are tracked. These prohibitions on the discharge and disposal of garbage and other solid debris from vessels would be incorporated as enforceable conditions into the DWPA license. The USCG enforces MARPOL and the Deepwater Port License and fines or penalties could be assessed where laws and regulations are violated. Short-term, minor, direct, adverse impacts on nonthreatened and nonendangered marine mammals could occur if marine debris were accidentally released during the Proposed Action.

Operations

Seafloor Disturbance and Turbidity. Operations activities would cause long-term disturbances in both soft- and hard-bottom habitat. The placement of buoy system parts and concrete mattresses along the pipeline route, as well as anchor sweep would result in 16.32 acres of long-term disturbance on soft-bottom habitat and 19.42 acres of long-term disturbance on hard-bottom habitat. An additional 18.98 acres of soft substrate/sand habitat would be disturbed due to anchor sweep. It is anticipated that long-term STL buoy anchor chain sweep would cause the resuspension of fine sediments and result in a sediment drape within immediately adjacent areas. Turbidity increases are associated with long-term chain and riser sweep. Turbidity associated with long-term chain scour is expected to be localized and in the lower portion of the water column. This area is not expected to recolonize because of long-term chain scour. Turbidity could spread from the immediate area of the proposed Port and affect different areas depending on the currents. Removal of bottom habitat, along with resident benthic organisms within the area, affects not only the benthic communities, but also the fish assemblages that rely on the benthos for food, which in turn are preyed upon by marine mammals. Once the disturbance ceases, the substrate would be available for recruitment of benthic organisms. Reestablishment of a benthic community similar to that in adjacent areas is expected to take a period of weeks to several years. Marine mammals could be indirectly impacted if benthic prey species were displaced or destroyed by construction activities. Affected species would be expected to recover soon after construction ceased, and would represent only a small portion of food available to marine mammals in the area. Short-term, minor, indirect, adverse impacts on nonthreatened and nonendangered marine mammals could occur as a result of seafloor disturbance caused during construction.

Vessel Traffic. A maximum of 90 SRVs could call on Port Dolphin per year. In the open ocean, SRVs typically travel at speeds of up to 19.5 knots. However, once approaching the vicinity of the terminal, SRVs would slow to about half-speed. Supply and crew vessels are expected to call on the SRVs while at Port Dolphin. Based on the estimated 90 calls a year, 938 supply vessel trips from onshore 22 locations in Tampa Bay are anticipated.

Vessel traffic can affect marine mammals by direct collisions with vessels, wave action from boat wakes, noise (which might cause behavioral disturbance), and accidental hydrocarbon spills. Potential impacts of noise from vessel traffic are discussed in the next section (entitled *Noise*). Increased vessel traffic would likely increase petroleum hydrocarbons discharged into the water; those possible impacts are discussed in the marine mammal sections regarding *hydrocarbon spills*.

Dolphins are commonly attracted to moving vessels and spend periods of time following these vessels or swimming within the bow waves of ships traveling at high speeds. It is generally considered that because these species are agile, powerful swimmers, they should be capable of avoiding collisions with oncoming vessels, however, this is not always the case. As noted in a worldwide review by Van Waerebeek et al. (2007), small-boat propellers have long been recognized as a cause of traumas in bottlenose dolphins and Atlantic spotted dolphins. It is known that bottlenose dolphins in Tampa Bay are occasionally struck by vessels (Wells and Scott 1997). It is not improbable to assume that rough-toothed dolphins too have been victims of vessel collisions; these likely have not been reported or published. Such injuries might or might not be lethal, and are believed to be uncommon and not result in population-level effects. Nonlethal injuries can reduce the breeding success of individuals and could permanently remove some animals from the breeding population (Hubard and Swartz 2002). Vessel traffic that disturbs dolphins could cause them to leave preferred habitats and could alter biologically important behaviors such as feeding, nursing, or resting (Hubard and Swartz 2002).

Adverse impacts on nonthreatened and nonendangered marine mammals could occur as a result of increased vessel traffic during construction (without mitigation and monitoring). *MMS NTL No. 2007-G04, Vessel Strike Avoidance and Injured/Dead Protected Species Reporting*, is designed to mitigate impacts on nonthreatened and nonendangered marine mammals. Any vessel strike of a nonthreatened and nonendangered marine mammal would be considered a "take" under the MMPA. However, project-related increases vessel traffic during construction would be small in comparison with existing vessel traffic in the area (see **Section 4.10**). Therefore, adverse impacts on non-threatened and non-endangered marine mammals from project-related vessel traffic during construction would be short-term and minor. Applicant-proposed BMPs and minimization measures to avoid or reduce impacts of vessel traffic and noise on marine mammals are found in **Section 4.11** and would help to reduce adverse affects on nonthreatened and nonendangered marine mammals.

Indirect effects from increased vessel traffic include increased wave action due to vessel wakes and scarring of seagrass beds by propellers (EPC 2007). The potential for impacts to seagrasses are important because they are habitat for dolphin prey (see **Section 4.2.13**). Wakes affect seagrass beds by the increase of wave action which can play a role in the decline of longshore sandbars that help protect seagrasses (Lewis 2002), as well as increased turbidity that, as noted earlier, reduces light availability and, therefore, seagrass production. Seagrasses would be avoided and mitigated based on the BMPs and the Project-specific Wetland and Waterbody Construction and Mitigation Procedures Plan. The plan would be developed in coordination with appropriate regulatory agencies and implemented prior to and during construction activities.

Noise. Long-term underwater noise impacts would be created by the operation of various equipment and powering systems on the SRVs and other support vessels, as well as from mooring (maneuvering on thrusters during approach to the mooring buoy), and the operation of processing equipment (regasification). An overlap is anticipated between arriving and departing SRVs; consequently, an SRV would be present most of the time. Under the Proposed Action, the Port would operate 24 hours a day, 365 days per year to provide a continuous supply of natural gas.

Background information on noise impacts on marine mammals and acoustic criteria can be found in **Section 4.2.1.2.1**, discussed in detail under *noise* in *construction impacts*.

Noise sources associated with operations include SRV transits and regasification. Noise modeling by JASCO (2008) for the Proposed Action indicates that marine mammals located 1.7 to 3.8 km (1.1 to 2.4 mi) for SRV docking and transit could be disturbed. The largest and most important source of anthropogenic sound is shipping, especially in low frequencies (NRC 2003). Other anthropogenic sound sources in the study areas include recreational boating, dredging, shoreline construction (e.g., bulkheads, revetments, docks, and pile-driving), urban and industrial development, aircraft, and SONARs. However, shipping is a major contribution to underwater SPLs, and its impact is strongest in frequencies from 0.005 to 0.5 kHz (NRC 2003). Noise profiles for the SRVs are within the range of shipping traffic in the area. Most noise would be short-term in duration and moderate in intensity.

Noise levels in the offshore area would be elevated when two SRVs are on buoys at the same time (separated by a distance of approximately 5.0 km (3.1 mi) (JASCO 2008). While SRVs are moored at the Port, main engines would not be operational, but shipboard machinery used to regasify or offload LNG, generate power, and maintain facilities, would produce continuous sources of noise. An additional noise source could include the sound produced by the flow of gas through the proposed flowline, although very little noise in the underwater environment would be expected (JASCO 2008).

Noise modeling was conducted for the SRVs for the offshore transit (full speed was assumed), buoy approach (half speed was assumed), and docking (three thrusters was assumed). However, it was later noted that a total of four thrusters could potentially be used. It was determined that the use of four thrusters rather than three thrusters would cause an increase of 1 or 2 dB re µPa and this difference would not be discernible due to ambient noise (Port Dolphin 2009b). Noise modeling indicates that overall, operational noise associated with the proposed Project is consistent with other man-made underwater noise sources in the area (e.g., commercial shipping, dredging). The source levels and frequencies for noise during routine deepwater port operations are presented in **Section 4.8.1.1**. **Table 4.2-17** and **Table 4.2.-18** present the distance from noise sources that Level A and Level B harassment of marine mammals could occur associated with SRVs under the different operational scenarios.

The SRV traffic associated with the Project would contribute incrementally to the underwater noise environment of the world's oceans. The main sources of vessel noise are propeller cavitation, propeller singing, and propulsion; other sources include auxiliaries, flow noise from water dragging along the hull, and bubbles breaking in the wake (Richardson et al. 1995). Vessel traffic is a major contributor to noise in the world's oceans, especially at low frequencies between 5 and 500 Hz (NRC 2003). During 2004, NOAA and a number of other government, industry, and academic partners convened the first formal meeting ("Shipping Noise and Marine Mammals: A Forum for Science, Management, and Technology") to consider the effects of sounds from large vessels on marine life. During 2007, NOAA convened a symposium to assess quieting applications for large commercial vessels.

The source levels associated with the regasification process are expected to be low (nearly 110 dB in the water, near the vessel). There are no situations where the noise level exceeds 120 dB even a few meters from the vessel (LGL 2008). Therefore, no effects on marine mammals are expected from noise associated with regasification.

The acoustic transponder would emit a 30-kHz signal at 188 to 192 dB re µPa when signaled by an incoming SRV. This signal is within the hearing range of dolphins that would be expected in the area of the Proposed Action. Noise modeling indicates that this signal would drop to below 180 dB re µPa at approximately 3 m (10 feet) and to 160 dB re µPa at approximately 32 m (105 feet). Planned monitoring should detect the presence of dolphins in the vicinity of the buoy. Dolphins might be indirectly affected by the transponder via any detection of the sounds by fish that might be affected by the transponder's signal (see **Section 4.2.1.12**). Such impacts would be short-term and also would not adversely affect dolphins.

Entanglement. Marine mammals could be entangled by anchors, anchor lines, or buoy lines associated with operations of the Port in offshore waters. However, the Applicant has incorporated measures (see **Section 4.11.1**, subsection *Marine Mammal Entanglement*) to reduce the potential for entanglement associated with construction activities. Long-term, minor, direct and indirect, adverse impacts on nonthreatened and nonendangered marine mammals could occur due to the increased risk of entanglement during routine Port operations.

Lighting. SRVs would be guided to the submerged unloading buoys by two lighted buoys floating on the sea surface. The lighted buoys would include flashing yellow lights, with an average lighting level of 900 to 1,000 Candelas. Once SRVs are securely moored, lighted buoys would be taken on board and turned off. Moored SRVs would be required to exhibit light signals appropriate for vessels at anchor. Deck lights also would be used to illuminate working decks during LNG regasification activities. Additionally, during installation, an environmental coordinator would be on site to ensure no violations would occur. All lights would be installed and utilized in accordance with NMFS and USFWS guidelines designed to reduce impacts on marine mammals. This would decrease attraction by fish and invertebrates to the area, as well as their marine mammal predators, thereby reducing the vulnerability of dolphins to possible disorientation, vessel strikes, noise, predation, and entanglement. Long-term, minor, direct, adverse impacts on nonthreatened and nonendangered marine mammals would be expected to occur as a result of lighting used during routine Port operations.

Seawater Intake and Cooling Water Discharge. Seawater would be taken in through one of two sea chests covered with a lattice screen. Impingement of healthy dolphins on the screen is not likely, since the water intake velocity is low (0.15 m/s) and healthy dolphins would be able to swim faster and stronger than the seawater intake velocity. The average swimming speeds for dolphins expected in the area of the Proposed Action include 1.1 to 5.6 m/s for bottlenose dolphins and 5.6 m/s for spotted dolphins (Noren 2004). Fish would not be expected to be impinged on the screen (see impacts section on fish), so dolphins would not be attracted to the screen due to any fish presence. Seawater uptake might indirectly impact threatened and endangered marine mammals, since plankton species could be entrained and subsequently killed by the seawater intake system. Plankton mortality could indirectly impact invertebrate and fish populations that feed on plankton. Long-term, minor, indirect, adverse impacts on nonthreatened and nonendangered marine mammals would be expected to occur as a result of seawater intake associated with the Project.

Cooling water would be discharged at 10 °C (18 °F) above ambient seawater temperature. Modeling indicates that cooling water temperature would be 1 °C (1.8 °F) above ambient temperature within 100 m (328 feet) of the discharge. The cooling water discharge is not expected to reach the seafloor. An increase in temperature could result in short-term behavioral and physiological impacts. Because the cooling water plumes compose a relatively small area, adverse affects to dolphins are unlikely.

Routine Discharges. While SRVs are present at the Port, they would not discharge domestic waste, bilge water, or ballast water. In addition, on the SRVs, gutter bars would be replaced around equipment where oil leaks could occur (e.g., mooring winches, cranes). Rain water from these areas would be drained to a bilge holding tank. No rain water would be discharged overboard, from areas around equipment where oil leaks would occur, while at the buoy. The firewater system discharges consist of uncontaminated seawater from testing the firefighting system on the SRVs. Based on the infrequent nature of the discharge; its short duration; and the lack of contaminants, long-term, minor, indirect, adverse impacts on nonthreatened and nonendangered marine mammals would be expected to occur as a result of other routine discharges associated with the Project.

Marine Debris. Both entanglement in and ingestion of debris have caused the death of or serious injury to marine mammals (Laist 1997). The discharge and disposal of garbage and other solid debris from

vessels by lessees is prohibited by the MMS (30 CFR 250.300) and the USCG (MARPOL Annex V, Public Law 100-220 [Statute 1458]) (33 CFR Part 151). *MMS NTL No. 2007-G03, Marine Trash and Debris Awareness and Elimination*, is designed to mitigate impacts of marine debris. The discharge of plastics, including ashes from burned plastics, is strictly prohibited and is therefore never authorized. All plastics must be returned to shore, and are tracked. These prohibitions on the discharge and disposal of garbage and other solid debris from vessels would be incorporated as enforceable conditions into the DWPA license. The USCG enforces MARPOL and the Deepwater Port License and fines or penalties could be assessed where laws and regulations are violated. Short-term, minor, direct, adverse impacts on nonthreatened and nonendangered marine mammals could occur if marine debris were accidentally released during the Proposed Action

Hydrocarbon Spills. Petroleum products can cause skin and eye irritation and could be toxic if ingested directly or indirectly via fish and invertebrates they prey upon. Cetacean responses to spilled oil are variable, with some observations of attempts to avoid spilled oil and other times, no attempts by the animals to avoid it (Geraci 1990, Smultea and Würsig 1995). Fresh crude oil releases toxic vapors that when inhaled can irritate or damage respiratory membranes, congest lungs, and cause pneumonia. Following inhalation, volatile hydrocarbons can be absorbed into the bloodstream and accumulate in the brain and liver, leading to neurological disorders and liver damage (Geraci and St. Aubin, 1982, Geraci 1990). Toxic vapor concentrations can occur just above the surface of an oil spill and, thus, can be available for inhalation by surfacing marine mammals. Exposure to hydrocarbons is likely to result in primarily sublethal impacts on marine mammals (e.g., decreased health, reproductive fitness, and longevity; and increased vulnerability to disease) with no long-term, population-level impacts.

Oil-spill response activities can affect marine mammals, either through exposure to response chemicals (e.g., dispersants or coagulants) applied to control or break down spilled surface oil, or through disturbance by or collision with spill response vehicles. The chemicals used during a spill response are toxic, but are considered much less so than the constituents of spilled oil (NRC 1989); there is little information regarding their potential effects on marine mammals. The presence of, and noise generated by, oil-spill response equipment and support vessels could temporarily disturb marine mammals in the vicinity of the response action, with affected individuals likely leaving the area. Oil-spill response support vessels can also increase the risk of collisions between these vessels and marine mammals in the vicinity of the spill response. Short-term, minor, direct and indirect, adverse impacts on nonthreatened and nonendangered marine mammals could result from the unlikely occurrence of a hydrocarbon spill during Port operations.

LNG Spills. Short-term, minor, direct, adverse impacts on nonthreatened and nonendangered marine mammals could occur in the unlikely event of an LNG spill. All SRVs are designed with features to minimize the potential for LNG spills (refer to Chapter 2, *Maritime Safety and Related Matters*). However, if an LNG spill were to occur, potential impacts would include exposure to low-temperature LNG at the water surface, possibly resulting in frostbite or death, and asphyxiation by natural gas vapors above the surface of the water. These impacts would likely occur in the immediate vicinity of the spill location; the timeframe of the impact is limited (see **Section 5**). Since LNG does not dissolve in water, the timeframe for these potential impacts would be limited, and no adverse toxic impacts would be expected after the LNG boiled off and the vapors dispersed.

Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

The process would probably result in temporary turbidity increases in the immediate vicinity of the proposed decommissioning activities. These increases would indirectly affect nonthreatened and nonendangered marine mammals by impacting their prey species (see previous sections on *Turbidity*). Additionally, the presence of additional vessels during decommissioning and typical debris-removal practices could potentially affect nonthreatened and nonendangered marine mammals marine mammals (see previous sections on *Vessel Traffic*). The Applicant specified that three types of vessels would be used during decommissioning, which includes one 4-point DSV barge with a 30-ton crane, two tugs to support the DSV barge, and one crew/supply vessel (Port Dolphin 2008a). The Applicant specified that approximately 156 vessel trips would be required for decommissioning over the course of approximately 2 months (Port Dolphin 2007a, 2008a). For more information on vessel traffic associated with decommissioning activities, see **Section 4.10.1**.

Decommissioning activities would occur mainly in the STL buoy area and would not involve any activities along the pipeline route or in nearshore waters. Decommissioning involves no use of explosives. Monitoring efforts during decommissioning would detect presence of marine mammal species and mitigate any impacts. Short-term, minor to moderate, direct and indirect, adverse impacts on nonthreatened and nonendangered marine mammals could occur during Project decommissioning.

4.2.1.7.2 Alternatives

Table 4.2-19 compares impacts from the Proposed Action to each of the alternatives with respect to nonthreatened and nonendangered marine mammals.

Southern Site and Route Alternative. Construction, operation, and decommissioning impacts on nonthreatened and nonendangered marine mammals under the Southern Site Route Alternative would be similar to those under the Proposed Action. Indirect impacts associated with turbidity would be slightly greater because the pipeline route would be longer.

Offshore Interconnection with Gulfstream Pipeline Alternative. Impacts on nonthreatened and nonendangered marine mammals would be less than the Proposed Action under this alternative. Under this alternative the pipeline would not come inshore because of the connection to the Gulfstream Pipeline. The connection would occur approximately 16 km (10 mi) from the mouth of Tampa Bay, in waters with a bottom depth of 20 feet. Seafloor disturbance associated with pipeline disturbance under this alternative would be less in shallow coastal waters and would not occur in Tampa Bay. A more detailed description of seafloor disturbance under this alternative is described in detail under Benthic Resources. There would also be less of an impact of turbidity in shallow coastal waters associated with pipeline installation under this alternative. Nonthreatened and nonendangered marine mammals inhabit shallow coastal waters, as well as deeper waters over the continental shelf (Würsig et al. 2000). However, the potential noise

associated with the Proposed Action is primarily going to be outside of the hearing ranges of the dolphin species likely to occur in the area (Southall 2007).

FSRU Port Design Alternatives. Construction, operation, and decommissioning impacts on nonthreatened and nonendangered marine mammals under the FSRU Alternative would be similar to those under the Proposed Action. The FSRU unit itself would require one set of anchors, as opposed to two sets of anchors for the SRVs included in the proposed Project. Also, use of the FSRU would not require a flexible riser to be pulled off the bottom as the buoy is raised to mate with the SRV. These features would result in decreased seafloor disturbance and turbidity associated with mooring line sweep and raising and lowering of the buoy. The discharge associated with the FSRU alternative would be fresh water. This discharge would travel a longer distance as a thin layer; therefore, the impacts would be minor.

AAV Alternative. Construction, operation, and decommissioning impacts on nonthreatened and nonendangered marine mammals under the AAV Alternative would be similar to those under the Proposed Action.

Suction Piles Anchoring Alternative. The noise impacts associated with pile driving, expected to be potentially moderate to potentially major during on non-threatened and non-endangered marine mammals under the proposed anchoring method (driving piles) would not occur with the use of the Suction Piles Anchoring Alternative. Therefore, use of the Suction Piles Anchoring Alternative would reduce short-term impacts associated with noise during construction from potentially moderate or potentially major, to minor.

No Action Alternative. The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, there would be no direct or indirect impacts on nonthreatened and nonendangered marine mammals. Alternative sources of natural gas might include other Deepwater LNG

Ports or onshore LNG terminals. Other deepwater LNG ports might have impacts on nonthreatened and nonendangered marine mammals that are similar to the Port Dolphin system but in a different geographic location. Onshore LNG terminals would be located in coastal areas where there could be a higher chance of impacting these species; however, it would depend on the location.

Table 4.2-19. Nonthreatened and Nonendangered Marine Mammals Impact Summary

Impact	Proposed Action	Southern Site and Route Alternative	Offshore Interconnection Alternative	FSRU Design Alternative	Suction Pile Anchoring Alternative
Pipeline construction	Minor, short-term, adverse impacts along pipeline route as a result of seafloor disturbance, noise, entanglement, and marine debris. Long-term impacts due to lighting.	Short-term impacts higher than Proposed Action (longer route).	Short-term impacts lower than Proposed Action (shorter route and no nearshore impacts).	No difference from Proposed Action.	No difference from Proposed Action.
Port construction	Minor, short- and long-term, adverse impacts in vicinity of Port comparable to pipeline construction impacts. Potentially moderate to major short-term adverse impacts associated with pile driving.	No difference from Proposed Action.	No difference from Proposed Action.	Short-term impacts as a result of seafloor disturbance and turbidity lower than Proposed Action (less anchors and no flexible riser).	Short-term, minor impacts associated with pile installation, (which is lower than Proposed Action).
Operation of Port	Minor, short-term, adverse impacts in vicinity of Port as the result of seawater intake, routine discharges, marine debris, and potential LNG/hydrocarbon spills; long-term impacts due to noise, entanglement, lighting, seawater intake and discharge.	No difference from Proposed Action.	No difference from Proposed Action.	Short-term impacts comparable to Proposed Action; higher long-term impacts (cool freshwater discharge).	No difference from Proposed Action.
Decommission of Port	No impacts.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.

Notes:

1. Under the No Action Alternative none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur. No direct or indirect impacts on biological resources would be anticipated.
2. The AAV Alternative was carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.2.1.8 Coastal and Marine Birds

4.2.1.8.1 Proposed Action

Sources of potential impacts on marine and coastal birds include lighting on vessels during construction, operations, and decommissioning; disturbance by vessel traffic during construction; and debris (entanglement/ingestion). In addition, marine and coastal birds could be affected in the unlikely event of a minor hydrocarbon spill, LNG release, or natural gas release.

Construction

The main potential impact during construction is disturbance due to vessel traffic in coastal waters. Near the mouth of Tampa Bay, the rerouted pipeline would pass between two NWRs that are important bird areas (see **Figure 3.2-1**). The Proposed Route is approximately 800 m (2,625 feet) from Passage Key NWR and 1,750 m (5,742 feet) from Egmont Key NWR.

Construction vessels would be of the same size and type previously identified, and they would be moving slowly. Taking into account the location of construction, vessel traffic would result in minor adverse impacts on marine and coastal birds. Several BMPs are proposed in **Section 4.11** would minimize disturbance from vessel traffic.

Vessel Traffic. Traffic increases would be short-term and temporary. Approximately 1,800 vessel trips are anticipated during the construction of Port Dolphin (within 11 months). Vessel traffic could result in degraded water quality and disturbance of foraging/reproductive activity. Disturbance often curtails breeding success; excessive disturbance can cause individuals to desert the nest, exposing eggs or chicks to the elements and predation. Interrupted feedings can stress juvenile birds during critical periods in their development (USFWS 2007c). The Project area is a busy Port with vessel traffic. Foraging birds in the Project area are currently exposed to vessel traffic. Also, **Section 4.11** addresses the BMPs and mitigation measures proposed to minimize impacts on birds near the Project area. These restrictions would be mandated on all vessels, except when USCG regulations or safety precautions supersede them. BMPs would reduce physical contact, thereby decreasing impacts on coastal and marine birds.

Short-term, minor, direct, adverse impacts on coastal and marine birds would be expected to occur as a result of increased vessel traffic generated by construction.

Noise. Localized, short-term increases in noise associated with construction could potentially affect coastal birds. The level of impact would vary depending on the bird species, type of vessel or machinery, vessel speed, relative noise level, distance, frequency, and season (MMS 2002b). During Project installation, increased noise levels could temporarily displace coastal and marine birds from commonly used feeding or resting areas, but displaced birds would be expected to return shortly after construction ceased. During construction, increased noise levels could temporarily displace foraging birds, but displaced individuals would be expected to return shortly after construction ceased. The lay barge and support vessels move very slowly down the pipeline corridor during installation activities to decrease the level of disturbance from wakes. Any local noise ordinances would also dictate construction work hours in this area. Animals, in general, tend to become less sensitive to those types of noise and disturbance to which they are repeatedly exposed (Richardson et al. 1995). Because the Proposed Action occurs in a busy Port, birds would be expected to have adapted to the variety of noise levels associated with Port Manatee and local industry.

Short-term, minor, direct and indirect, adverse impacts on wood storks could occur as a result of noise associated with construction.

Lighting. The use of lights on construction and support vessels would be short-term, temporary, and transient. Lights would be installed and used in accordance with USFWS guidelines designed to reduce impacts in comparable construction projects (USFWS 2000). The construction activities would be performed to avoid sensitive areas during bird nesting season, to the extent practicable. In addition, the lay barge and support vessels move very slowly down the pipeline corridor during installation activities. Any local noise ordinances would also dictate construction work hours in this area. BMPs and mitigation measures (see **Section 4.11**) would further minimize impacts on birds near the Project area.

Lighting associated with construction of the Proposed Action would have minor, short-term, adverse impacts on coastal and marine birds in the Project area.

Operations

Vessel Traffic. Traffic increases associated with routine Port operations would be minor compared to the total vessel traffic in the Project area. Through planning, the Applicant has proposed vessel routes that would avoid sensitive receptors (e.g., bird colonies) to the extent feasible and would also limit the number of vessel trips as much as possible. These vessel route and trip restrictions would be mandated on all vessels, except when USCG regulations or safety precautions supersede them. Support and pilot vessel operators would be required to maintain slow, wake-free speeds while navigating through sensitive inland and coastal waterways, and no physical contact with coastal and marine birds would be anticipated.

SRVs and support vessels in transit to and from the Port could result in long-term, minor, direct, adverse impacts on coastal and marine birds.

Noise. Noise created by SRVs and support vessels in transit to and from the Port would be continuous, yet transient, for short periods of time. Animals, in general, tend to become less sensitive to those types of noise and disturbance to which they are repeatedly exposed (Richardson et al. 1995). Because the construction activities, associated with the Proposed Action, occur in a busy Port and shipping channel, wood storks and piping plovers would be expected to have adapted to the variety of noise levels associated with Port Manatee and local industry.

Long-term, minor, direct, adverse impacts on coastal and marine birds could occur as a result of the noise created during routine Port operations.

Lighting. Lighting aboard SRVs would be low, and all lights would be installed and utilized in accordance with USFWS guidelines designed to reduce migratory bird impacts (USFWS 2000). The use of solid or pulsating red lights would be avoided, and all deck lighting would be downshielded to minimize visibility to birds above.

Long-term, minor, direct, adverse impacts on coastal and marine birds could result from the lights used during routine Port operations.

Marine Debris. Birds could be seriously injured or killed if they became entangled in or ingested construction debris or other materials accidentally released by SRVs moored at the Port. Marine debris could also affect a bird's ability to successfully migrate, feed, mate, or nest. Long-term, minor, direct, adverse impacts on coastal and marine birds could occur as a result of marine debris associated with the Project. The discharge and disposal of garbage and other solid debris from vessels by lessees is prohibited by the MMS (30 CFR 250.300) and the USCG (MARPOL Annex V, Public Law 100-220 [Statute 1458]) (33 CFR Part 151). The discharge of plastics, including ashes from burned plastics, is strictly prohibited and is therefore never authorized. All plastics must be returned to shore, and are tracked. These prohibitions on the discharge and disposal of garbage and other solid debris from vessels

would be incorporated as enforceable conditions into the DWPA license. The USCG enforces MARPOL and the Deepwater Port License and fines or penalties could be assessed where laws and regulations are violated.

In addition, no food or garbage would be discharged into the sea. All such materials would be placed in proper containers and disposed of in accordance with applicable regulations. No wildlife would be fed or intentionally attracted to the SRVs or support vessels, and no fishing by crewmembers would be allowed. Given the relatively small amount of marine debris associated with the Project, major increases in sea turtle ingestion of or entanglement in debris would not be expected.

The relatively small amount of marine debris potentially generated at the Port, along with required avoidance measures would result in short-term, minor, adverse impacts on coastal and marine birds.

Hydrocarbon Spills. The impacts of hydrocarbons on birds are caused by the physical and chemical nature of the spill, by clean-up operations, or indirectly through physical damage to the foraging habitats in the Project area. Species that dive for their food or which congregate on the sea surface are particularly at risk (e.g., cormorants, black skimmers, and terns). Although oil ingested by birds during attempts to clean themselves by preening can be lethal, the most common cause of death is from drowning, starvation, and loss of body heat following fouling of plumage by oil (ITOPF 2008). There would be no ship-to-ship fuel oil transfer and the Port would operate under the provisions of an approved oil spill contingency plan. Vessels would be operated in compliance with all applicable spill prevention requirements and would have spill response plans.

Short-term and long-term, minor, direct and indirect, adverse impacts on coastal and marine birds could result from the unlikely occurrence of a hydrocarbon spill.

LNG Spills. Potential impacts would include exposure to low-temperature LNG at the water surface, possibly resulting in frostbite or death, and asphyxiation by natural gas vapors above the surface of the water. These impacts would likely occur in the immediate vicinity of the spill; the timeframe of the impact is limited (see **Section 5**). Since LNG does not dissolve in water, the timeframe for these potential impacts would be limited, and no adverse toxic impacts would be expected after the LNG boiled off and the vapors dispersed. Because of the low temperatures in the vicinity of the spill, coastal and marine birds would be expected to avoid the area.

Short-term, minor, direct, adverse impacts on coastal and marine birds could occur in the unlikely event of an LNG spill.

Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the

FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Therefore, impacts on coastal and marine birds are expected to be reduced, although a specific timeline would be developed at the time of decommissioning and abandonment.

Short-term, minor, direct and indirect, adverse impacts on coastal and marine birds could occur during Project decommissioning.

4.2.1.8.2 Alternatives

Table 4.2-20 compares impacts from the Proposed Action to each of the alternatives with respect to coastal and marine birds.

Southern Site and Route Alternative. Construction, operation, and decommissioning impacts on coastal and marine birds under the Southern Site Route Alternative would be similar to those under the Proposed Action.

Offshore Interconnection with Gulfstream Pipeline Alternative. Impacts on coastal and marine birds would be less than the Proposed Action under this alternative. Under this alternative the pipeline would not come inshore because of the connection to the Gulfstream pipeline. Shorebirds and wading birds inhabit shallow coastal waters and thus would not be impacted under this alternative. Impacts on seabirds and migratory birds would be similar to those under the Proposed Action. Seafloor disturbance associated with pipeline disturbance under this alternative would be less in shallow coastal waters and would not occur in Tampa Bay. A more detailed description of seafloor disturbance under this alternative is described in detail under Benthic Resources. There would also be less of an impact of turbidity in shallow coastal waters associated with pipeline installation under this alternative. There would be no turbidity increases associated with pipeline installation in Tampa Bay under this alternative.

FSRU Port Design Alternatives. Construction, operation, and decommissioning impacts on coastal and marine birds under the FSRU Port Design Alternative would be similar to those under the Proposed Action. The discharge associated with the FSRU alternative would be fresh water. This discharge would travel a longer distance as a thin layer; therefore, the impacts would be minor.

AAV Alternative. Construction, operation, and decommissioning impacts on coastal and marine birds under the AAV Alternative would be similar to those described under the Proposed Action.

Suction Piles Anchoring Alternative. Construction, operation, and decommissioning impacts on coastal and marine birds under the Suction Piles Anchoring Alternative would be similar to or less than those described under the Proposed Action.

No Action Alternative. The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, no direct or indirect impacts on coastal and marine birds would be expected.

Table 4.2-20. Coastal and Marine Birds Impacts Summary

Impact	Proposed Action	Southern Site and Route Alternative	Offshore Interconnect Alternative	FSRU Design Alternative	AAV Alternative	Suction Pile Anchoring Alternative
Pipeline construction	Minor, short-term, adverse impacts along pipeline route as a result of vessel traffic and noise.	Short-term impacts comparable to Proposed Action (route farther from Egmont Key but closer to Passage Key).	Short-term impacts lower than Proposed Action (no nearshore impacts).	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.
Port construction	Minor, short-term, adverse impacts in the vicinity of the Port as a result of vessel traffic and noise.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	Short-term impacts lower than Proposed Action (lower noise levels).
Operation of Port	Minor, short-term, adverse impacts due to potential LNG/hydrocarbon spills. Long-term impacts due to vessel traffic, noise, lighting, marine debris, and potential hydrocarbon spills.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	Long-term impacts higher than Proposed Action (additional lighting).	No difference from Proposed Action.
Decommission of Port	Minor, short-term and long-term, adverse impacts in vicinity of Port are similar to but lower than Port construction impacts.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.

Note: Under the No Action Alternative none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur. No direct or indirect impacts on biological resources would be anticipated.

4.2.1.9 Phytoplankton

4.2.1.9.1 Proposed Action

Construction

Turbidity. Turbidity refers to any insoluble particulate matter suspended in the water column that impedes light passage by scattering and absorbing light energy. Turbidity would indirectly impact phytoplankton, because increases in turbidity would cause a reduction in the depth of light penetration, and would have the potential to negatively impact phytoplankton productivity (Berry et al. 2003).

The extent of the turbidity plume generated would depend on the amount of sediment disturbed, the grain size, and weight of the disturbed sediment particles; the techniques employed to install and bury the pipeline; and the ambient current dynamics. Coarser, heavier sediment particles would resettle quickly (e.g., within hours), while finer, lighter sediment particles would remain suspended for longer periods of time (e.g., days). Sediment concentrations can be high initially and decay rapidly with distance.

As indicated in **Section 4.1.1**, turbidity modeling (SSFATE) conducted by the Applicant was used to estimate the area in which sediment concentrations would continue to exceed 100 mg/L after 30 minutes. Under worst-case conditions, is estimated that sediment concentration would exceed 100 mg/L for less than 2 hours (ASA 2008). The turbidity plumes would be short-lived and remain fairly close to their source. The total areal extent of the turbidity plumes created during pipeline installation is estimated to be approximately 1,894 hectares (4,679 acres) (ASA 2008). However, the actual distance from the source would depend on the source (e.g., HDD, dredge) and prevailing conditions (e.g., weather and tide). Turbidity events could occur any time during Port installation, which would take approximately 11 months. Impacts on phytoplankton are designated as minor because the impacts are expected to be short in duration or localized (in the immediate area of the Port and Pipeline and in the lower portion of the water column, where phytoplankton are expected to be less abundant). Therefore, short-term, minor, indirect, adverse impacts on phytoplankton would occur as a result of turbidity increases associated with the installation of the Port and Pipeline. BMPs are expected to be effective in reducing the magnitude and extent of impacts resulting from sediment suspension during pipeline construction, and therefore, the impact of turbidity on phytoplankton. However, the performance of the measures should be monitored during construction to verify their effectiveness. The Applicant has stated the intention to apply for a variance from state NPDES turbidity standards, which, if granted, would not reduce adverse impacts, and would likely result in an increase in adverse impacts due to turbidity. BMPs are discussed in detail in **Section 4.11**.

Hydrostatic Test Water Intake and Discharges. The proposed use of approximately 24 million gallons of filtered, surface seawater during flushing and hydrostatic testing of the pipeline would result in the entrainment of phytoplankton. This volume includes flooding the pipeline twice, once for flushing and once for hydrostatic testing. Water would be withdrawn from surface waters at a velocity of 0.2 m/s (0.5 feet/s), where phytoplankton is expected to be most abundant. Short-term, minor, direct, adverse impacts from entrainment of phytoplankton would occur during pipeline hydrostatic testing.

As stated in **Section 4.1.1,** the discharge of hydrostatic test water would have a short-term, minor, localized impact on water quality. Therefore, short-term, negligible, localized impacts on phytoplankton would occur. BMPs located in **Section 4.11** would be expected to be effective in reducing the magnitude and extent of impacts of hydrostatic testing on phytoplankton. However, the performance of the BMPs should be monitored during construction to verify their effectiveness.

Lighting. The Applicant has committed to using downshielding on lights used to identify construction vessels and illuminate working decks. Further, lighting on construction vessels would not illuminate surrounding waters. Additionally, during installation an environmental coordinator would be on site to ensure no violations would occur. Therefore, no adverse impacts on phytoplankton are expected to occur as a result of lights associated with the construction vessels.

Operations

Turbidity. Turbidity associated with long-term chain scour would be expected to be localized and in the lower portion of the water column where phytoplankton are lower in abundance. Therefore, long-term, minor, indirect, adverse impacts on phytoplankton would occur as a result of turbidity increases associated with chain-and-riser sweep associated with the operations of the proposed Port.

Lighting. SRVs would be guided to the submerged unloading buoys by two lighted buoys floating on the sea surface. The lighted buoys would include flashing yellow lights, with an average lighting level of 900 to 1,000 Candelas. Once SRVs are securely moored, lighted buoys would be taken on board and turned off. Moored SRVs would be required to exhibit light signals appropriate for vessels at anchor. Deck lights would also be used to illuminate working decks during LNG regasification activities. No adverse impacts on phytoplankton would be expected to occur as a result of lighting used during routine Port operations.

Seawater Intake and Cooling Water Discharge. While at the Port, two SRVs would use approximately 23.66 MGD of seawater as ballast and cooling water over the course of 4 to 8 days. Seawater intake would be through one of two upper or lower sea chests each measuring 1.5 m by 2.0 m (4.9 feet by 6.56 feet). Average water velocity through the lattice screens at the hull side shell would not exceed 0.15 m/s (0.5 feet/s).

Phytoplankton would be entrained in the ballast and cooling water intake of the SRVs. However, the proposed Project area is not a closed system. The plankton community is highly dynamic (e.g., patchy and highly variable in density over space and time). Due to their low motility and that they are greatly affected by the circulatory patterns in the GOM, impacts on phytoplankton would be temporary and minor. Therefore, long-term, minor, direct, adverse impacts on phytoplankton would occur from SRV seawater intake.

Cooling water would be discharged at 10 °C (18 °F) above ambient seawater temperature and would cool to 1 °C (1.8 °F) above ambient seawater temperature within 100 m (328 feet) of the discharge. An increase in temperature could result in adverse impacts on phytoplankton in the discharge plume. Because the two cooling water discharge plumes compose a relatively small area, impacts are expected to be minor. Additionally, as stated above, the plankton community is highly dynamic (e.g., patchy and highly variable in density over space and time). Due to their low motility and that they are greatly affected by the circulatory patterns in the GOM, impacts on phytoplankton would be temporary and minor. Therefore, short-term, minor, localized impacts on phytoplankton would result from the cooling water discharge.

BMPs were proposed by the Applicant to avoid and minimize impacts from the seawater intake and cooling water discharge associated with the operation of the Port (see **Section 4.11)**.

Routine Discharges. Cooling water discharges and testing of the firefighting system would comply with NPDES permit conditions. While SRVs are present at the Port, they would not discharge domestic waste, bilge water, or ballast water. In addition, on the SRVs, gutter bars would be replaced around equipment where oil leaks could occur (e.g., mooring winches, cranes). Rain water from these areas would be

drained to a bilge holding tank. No rain water would be discharged overboard, from areas around equipment where oil leaks would occur, while at the buoy. The firewater system discharges consist of uncontaminated seawater from testing the firefighting system on the SRVs. Based on the infrequent nature of the discharge, its short duration, and the lack of contaminants, impacts on phytoplankton would be expected to be minor.

BMPs found in **Section 4.11** would reduce the impact of routine vessel discharges on phytoplankton.

Hydrocarbon Spills. Phytoplankton could be impacted by the physical contamination, smothering, and toxic effects of hydrocarbons. Based on the amounts of hydrocarbons stored on the SRVs (see **Section 2.3.3**) and the fact that all SRVs are designed with features to minimize the potential for oil spills (see **Section 2.3.10**), the impact is designated as minor and short-term.

LNG Spills. Potential impacts would include exposure to low-temperature LNG at the water surface, possibly resulting in the death of the phytoplankton that would be in contact with the LNG. These impacts would likely occur in the immediate vicinity of the spill; the timeframe of the impact is limited (see **Section 5**). Acute effects would most likely result in loss of phytoplankton very close to the surface of the spilled LNG. Therefore, minor, direct, adverse impacts on phytoplankton would occur in the unlikely event of an LNG spill.

BMPs found in **Section 4.11** would both help to avoid and reduce the impacts of hydrocarbon and LNG spills, which would reduce potential impacts on phytoplankton.

Decommissioning

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action. Decommissioning activities would result in restrictions similar to those described for the construction process. Due to the in-place abandonment procedures for the pipeline, decommissioning activities are anticipated to take less time than construction. Decommissioning activities could result in an increase in turbidity, which would have the potential to negatively impact phytoplankton productivity by reducing the depth of light penetration (Berry et al. 2003). Impacts from these activities are expected to be similar to those discussed above for construction and would be temporary in nature and localized in scope (in the immediate area of the Port). Short-term, minor, direct, adverse impacts on phytoplankton would occur from decommissioning of the Port.

4.2.1.9.2 Alternatives

Table 4.2-21 compares impacts from the Proposed Action to each of the alternatives with respect to phytoplankton.

Southern Site and Route Alternative. Construction, operation, and decommissioning impacts on phytoplankton under the Southern Site Route Alternative would be similar to those under the Proposed

Action. Impacts associated with turbidity would be slightly greater because pipeline route would be longer.

Offshore Interconnection with Gulfstream Pipeline Alternative. Impacts on phytoplankton would be less than the Proposed Action under this alternative. Under this alternative the pipeline would not come inshore because of the connection to the Gulfstream pipeline. The connection would occur approximately 16 km (10 mi) from the mouth of Tampa Bay, in water depth of 6 m (20 feet). Turbidity associated with pipeline installation under this alternative would be less under this alternative.

FSRU Port Design Alternatives. Short-term impacts during construction would be lower under this alternative than under the Proposed Action. There are fewer anchors and no flexible riser and under this alternative; seafloor disturbance and turbidity would be lower. Therefore, impact on phytoplankton would also be lower.

Operation impacts on phytoplankton under the FSRU Port Design Alternative would be approximately 4.8 times higher than under the Proposed Action. As described in **Section 2.1.3.3**, the cooling and ballast water intake for LNGCs serving the FSRU would be approximately 4.8 times higher than for the Proposed Action. The discharge associated with the FSRU alternative would be fresh water. This discharge would travel a longer distance as a thin layer; therefore, the impacts would be minor.

AAV Alternative. Construction, operation, and decommissioning impacts on phytoplankton under the AAV Alternative would be approximately 4.8 times higher than under the Proposed Action. As described in **Section 2.1.3.3**, the cooling and ballast water intake for the AAV Alternative would be approximately 4.8 times higher than for the Proposed Action. The discharge associated with the AAV Alternative would be fresh water. This discharge would travel a longer distance as a thin layer; therefore, the impacts would be minor.

Suction Piles Anchoring Alternative. Construction, operation, and decommissioning impacts on phytoplankton under the Suction Piles Anchoring Alternative would be similar to those under the Proposed Action.

No Action Alternative. The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In

addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, no direct or indirect impacts on phytoplankton would be expected. Other Deepwater LNG Ports would have impacts on phytoplankton that are similar to the Port Dolphin.

Table 4.2-21. Phytoplankton Impacts Summary

Impact	Proposed Action	Southern Site and Route Alternative	Offshore Interconnect Alternative	FSRU Design Alternative	AAV Alternative
Pipeline construction	Minor, short-term, adverse impacts along pipeline route as a result of turbidity and hydrostatic testing and discharges.	Short-term impacts higher than Proposed Action (longer route).	Short-term impacts lower than Proposed Action (shorter route).	No difference from Proposed Action.	No difference from the Proposed Action.
Port construction	Minor, short-term, adverse impacts in the vicinity of the Port as a result of turbidity.	No difference from Proposed Action.	No difference from Proposed Action.	Short-term impacts as a result of turbidity lower than Proposed Action (fewer anchors and no flexible riser).	No difference from the Proposed Action
Operation of Port	Minor, long-term, adverse impacts due to seawater intake and discharges, routine discharges, and potential LNG/hydrocarbon spills. Long-term impacts due to chain sweep and marine debris.	No difference from Proposed Action.	No difference from Proposed Action.	Seawater intake and discharges would be approximately 5 times higher than the Proposed Action. Therefore, long-term, adverse impacts on phytoplankton would be greater than for the Proposed Action.	Seawater intake and discharges would be approximately 5 times higher than the Proposed Action. Therefore, long-term, adverse impacts on phytoplankton would be greater than for the Proposed Action.
Decommission of Port	Minor, short-term adverse impacts would be similar to construction of the pipeline and Port. Impacts of decommissioning would be lower than construction.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from the Proposed Action.

Notes:

1. Under the No Action Alternative none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur. No direct or indirect impacts on biological resources would be anticipated.
2. Suction Pile Anchoring Alternatives were carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.2.1.10 Zooplankton

4.2.1.10.1 Proposed Action

Construction

Turbidity. Turbidity refers to any insoluble particulate matter suspended in the water column that impedes light passage by scattering and absorbing light energy. Turbidity on marine zooplankton results in impacts such as reduced vertical migrations, reduced feeding, direct mortality and toxicity, and physiological impairment (Berry et al. 2003, Byrnes et al. 2003). Laboratory tests indicated that mysids exposed to 230 mg/L of natural sediment and copepods exposed to 1,020 mg/L of natural sediment for 28 days experienced 40 percent and 60 to 80 percent mortality, respectively (Berry et al. 2003). Impacts on zooplankton from turbidity are expected to be restricted to the lower portion of the water column (Byrnes et al. 2003).

The extent of the turbidity plume generated would depend on the amount of sediment disturbed, the grain size, and weight of the disturbed sediment particles, the techniques employed to install and bury the pipeline, and the ambient current dynamics. Coarser, heavier sediment particles would resettle quickly (e.g., within hours), while finer, lighter sediment particles would remain suspended for longer periods of time (e.g., days). Sediment concentrations can be high initially and decay rapidly with distance.

As indicated in **Section 4.1.1**, turbidity modeling (SSFATE) conducted by the Applicant was used to estimate the area in which sediment concentrations would continue to exceed 100 mg/L after 30 minutes. Under worst-case conditions, is estimated that sediment concentration would exceed 100 mg/L for less than 2 hours (ASA 2008). The turbidity plumes would be short-lived and remain fairly close to their source. The total areal extent of the turbidity plumes created during pipeline installation is estimated to be approximately 1,894 hectares (4,679 acres) (ASA 2008). However, the actual distance from the source would depend on the source (e.g., HDD, dredge) and prevailing conditions (e.g., weather and tide). Impacts on zooplankton are designated as minor because the impacts are expected to be short in duration or localized (in the immediate area of the Port and Pipeline and in the lower portion of the water column, where zooplankton are expected to be less abundant). Therefore, short-term, minor, indirect, adverse impacts on zooplankton would occur as a result of turbidity increases associated with the installation of the Port and Pipeline.

Overall turbidity increases would be temporary in duration and localized in scope. Therefore, short-term, minor, indirect, adverse impacts on zooplankton would occur as a result of turbidity increases associated with the installation of the Port and Pipeline.

BMPs found in **Section 4.11** are expected to be effective in reducing the magnitude and extent of impacts resulting from sediment suspension during pipeline construction and therefore, the impact of turbidity on zooplankton. However, the performance of the measures should be monitored during construction to verify their effectiveness. Application for variance from turbidity standards would not be effective in reducing adverse impacts, and could, in fact, result in an increase in adverse impacts.

Hydrostatic Test Water Intake and Discharges. The proposed use of approximately 24 million gallons of surface seawater during flushing and hydrostatic testing of the pipeline would result in the entrainment of zooplankton. This volume includes flooding the pipeline twice, once for flushing and once for hydrostatic testing. Water would be withdrawn from surface waters at a velocity of 0.2 m/s (0.5 feet/s). Therefore, short-term, minor, direct, adverse impacts on zooplankton would occur as a result of pipeline hydrostatic testing intake.

As stated in **Section 4.1.1,** discharge hydrostatic test would have a short-term, minor, localized impact on water quality. Therefore, short-term, negligible, localized impacts on zooplankton would occur.

Lighting. Zooplankton could be attracted to lights, making them vulnerable to predation. The Applicant has committed to using downshielding on lights used to identify construction vessels and illuminate working decks. Further, lighting on construction vessels would not illuminate surrounding waters. Additionally, during installation an environmental coordinator would be on site to ensure no violations would occur. Therefore, the potential impacts on zooplankton would be avoided.

Operations

Turbidity. Impacts from turbidity are expected to be restricted to the lower portion of the water column. Impacts on zooplankton are designated as minor because the impacts are expected to be localized (in the immediate area of the Port and in the lower portion of the water column, where zooplankton are less abundant). Therefore, long-term, minor, indirect, adverse impacts on zooplankton would occur as a result of turbidity increases associated with chain and riser sweep associated with the operations of the proposed Port.

Lighting. Zooplankton could be attracted to lights associated with the STL buoys, making them vulnerable to predation. Lights used to identify SRVs moored at the Port and to illuminate working decks would not intentionally illuminate surrounding waters. Additionally, the plankton community is dynamic and greatly affected by the circulatory patterns in the GOM. Based on these dynamics, impacts on zooplankton would be expected to be long-term, minor, indirect, and adverse.

Seawater Intake and Cooling Water Discharge. Zooplankton would be entrained in the seawater intake. While at the Port, two SRVs would use approximately 23.66 MGD of seawater as ballast and cooling water over the course of 4 to 8 days. Seawater intake would be through one of two upper or lower sea chests each measuring 1.5 m by 2.0 m (4.9 feet by 6.56 feet). Average water velocity through the lattice screens at the hull side shell would not exceed 0.15 m/s (0.5 feet/s).

The daily impact on zooplankton was estimated based on the wet weight of the standing crop of zooplankton on the western Florida shelf ranging from 0.031 to 0.2 mg/m^3 (2.6 x 10^{-7} to 1.7 x 10^{-6} pounds/gallon) and a total seawater intake of 23.66 MGD (Okey and Mahmoudi 2002). Seawater use by the Project would, therefore, remove approximately 2.8 to 18.3 kg (6 to 40 lb) of zooplankton each day. Limitations of this analysis are based on the fact that the distribution and abundance of zooplankton is spatially variable and patchy and the gear used to collect zooplankton might have been too large to collect smaller zooplankton which could be important to total biomass.

Laboratory and field studies of marine organisms indicate that the average efficiency of energy transfer from one trophic level on the food web to the next trophic level is about 10 percent. In other words, only 10 percent of the energy available at one trophic level is passed on to the next (Sumich 1988). Therefore, a loss of 2,245 to 14,681 pounds of zooplankton each year (losing 6 to 40 pounds each day for 365 days per year) would result in the total annual loss of approximately 225 to 1,468 pounds of small planktivorous fish biomass and approximately 23 to 147 pounds of large piscivorous fish biomass. These estimates are conservative because the consumption of zooplankton and small planktivorous fish was assumed to be 100 percent. This represents a minor loss compared to the total amount of biomass available in the GOM.

Long-term, minor, localized impacts on zooplankton would result from the cooling water discharges. Cooling water would be discharged at 10 °C (18 °F) above ambient seawater temperature and would cool to 1 °C (1.8 °F) above ambient seawater temperature within 100 m (328 feet) of the discharge. An

increase in temperature could result in adverse impacts on zooplankton in the discharge plume. Because the two cooling water discharge plumes compose a relatively small area, impacts would be expected to be minor and direct.

BMPs proposed by the Applicant to avoid and minimize impacts from the seawater intake and cooling water discharge associated with the operation of the Port are discussed in detail in **Section 4.11**.

Other Routine Discharges. Cooling water discharges and testing of the firefighting system would comply with NPDES permit conditions. While SRVs are present at the Port, they would not discharge domestic waste, bilge water, or ballast water. In addition, on the SRVs, gutter bars would be replaced around equipment where oil leaks could occur (e.g., mooring winches, cranes). Rain water from these areas would be drained to a bilge holding tank. No rain water would be discharged overboard, from areas around equipment where oil leaks would occur, while at the buoy. The firewater system discharges consist of uncontaminated seawater from testing the firefighting system on the SRVs. Based on the infrequent nature of the discharge, its short duration, and the lack of contaminants, impacts on zooplankton would be expected to be minor.

BMPs outlined in **Section 4.11** would avoid the impact of routine vessel discharges on zooplankton.

Hydrocarbon Spills. Based on the amounts of hydrocarbons stored on the SRVs (see **Section 2.3.3**) and the fact that all SRVs are designed with features to minimize the potential for oil spills (see **Section 2.3.10**), the impact is designated as minor and short-term. Zooplankton could be impacted by physical contamination, smothering, and toxic effects of hydrocarbons. Acute effects would most likely result in loss of populations near the release or accident, but no long-term impacts on areawide populations from loss of these individuals is expected. Overall impacts on zooplankton from hydrocarbon spills would be short-term, minor, direct, and adverse.

LNG Spills. Potential impacts would include exposure to low-temperature LNG at the water surface, possibly resulting in frostbite or death, and asphyxiation by natural gas vapors above the surface of the water. These impacts would likely occur in the immediate vicinity of the spill; the timeframe of the impact is limited (see **Section 5**). Acute effects would most likely result in loss of local populations near the release or accident. Short-term, minor, direct, adverse impacts on zooplankton would occur in the unlikely event of an LNG spill.

BMPs discussed in **Section 4.11** would help to avoid and reduce the impacts of hydrocarbon and LNG spills, which would reduce potential impacts on zooplankton.

Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the

FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Decommissioning activities could cause the resuspension of sediments and an increase in turbidity. Impacts from these activities are expected to be similar to those discussed above for construction and would be temporary in nature and localized in scope (in the immediate area of the Port). Overall, it is expected that decommissioning activities would have short-term, minor, direct, and adverse impacts on zooplankton.

4.2.1.10.2 Alternatives

Table 4.2-22 compares impacts from the Proposed Action to each of the alternatives with respect to zooplankton.

Southern Site and Route Alternative. Construction, operation, and decommissioning impacts on zooplankton under the Southern Site Route Alternative would be similar to those under the Proposed Action. Impacts associated with turbidity would be slightly greater because the pipeline route would be longer.

Offshore Interconnection with Gulfstream Pipeline Alternative. Impacts on zooplankton would be less than the Proposed Action under this alternative. Under this alternative the pipeline would not come inshore because of the connection to the Gulfstream pipeline. The connection would occur approximately 16 km (10 mi) from the mouth of Tampa Bay, in water depth of 6 m (20 feet). Turbidity associated with pipeline installation under this alternative would be less under this alternative.

FSRU Port Design Alternatives. Short-term impacts during construction would be lower under this alternative than under the Proposed Action. There are fewer anchors and no flexible riser and under this alternative; seafloor disturbance and turbidity would be lower. Therefore, impact on zooplankton would also be lower.

Operation impacts on zooplankton under the FSRU Port Design Alternative would be approximately 4.8 times higher than under the Proposed Action. As described in **Section 2.1.3.3**, the cooling and ballast water intake for LNGCs serving the FSRU would be approximately 4.8 times higher than for the Proposed Action. The discharge associated with the FSRU alternative would be fresh water. This discharge would travel a longer distance as a thin layer; therefore, the impacts would be minor.

AAV Alternative. Construction, operation, and decommissioning impacts on phytoplankton under the AAV Alternative would be approximately 4.8 times higher than under the Proposed Action. As described in **Section 2.1.3.3**, the cooling and ballast water intake associated with the AAV Alternative would be approximately 4.8 times higher than for the Proposed Action. The discharge associated with the AAV Alternative would be fresh water. This discharge would travel a longer distance as a thin layer; therefore, the impacts would be minor.

Suction Piles Anchoring Alternative. Construction, operation, and decommissioning impacts on zooplankton under the Suction Piles Anchoring Alternative would be similar to those under the Proposed Action.

No Action Alternative. The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No

Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, no direct or indirect impacts on zooplankton would be expected. Alternative sources of natural gas might include other Deepwater LNG Ports or onshore LNG terminals. Other Deepwater LNG Ports might have impacts on zooplankton that are similar to the Port Dolphin.

Table 4.2-22. Zooplankton Impacts Summary

Impact	Proposed Action	Southern Site and Route Alternative	Offshore Interconnect Alternative	FSRU Design Alternative	AAV Alternative
Pipeline construction	Minor, short-term, adverse impacts along pipeline route as a result of turbidity and hydrostatic testing and discharges.	Short-term impacts higher than Proposed Action (longer route).	Short-term impacts lower than Proposed Action (shorter route).	No difference from Proposed Action.	No difference from Proposed Action.
Port construction	Minor, short-term, adverse impacts in the vicinity of the Port as a result of turbidity.	No difference from Proposed Action.	No difference from Proposed Action.	Short-term impacts as a result of turbidity lower than Proposed Action (fewer anchors and no flexible riser).	Short-term impacts as a result of turbidity lower than Proposed Action (anchors and no flexible riser).
Operation of Port	Minor, short-term, adverse impacts due to seawater intake and cooling water discharges, routine discharges, and potential LNG/hydrocarbon spills. Long-term impacts due to chain sweep and marine debris.	No difference from Proposed Action.	No difference from Proposed Action.	Seawater intake and discharges would be approximately 5 times higher than the Proposed Action. Therefore, long-term, adverse impacts on phytoplankton would be greater than for the Proposed Action.	Seawater intake and discharges would be approximately 5 times higher than the Proposed Action. Therefore, long-term, adverse impacts on phytoplankton would be greater than for the Proposed Action.
Decommission of Port	Minor, short-term adverse impacts would be similar to construction of the pipeline and Port. Impacts of decommissioning would be lower than construction.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.

Note:

1. Under the No Action Alternative none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur. No direct or indirect impacts on biological resources would be anticipated.
2. Suction Pile Anchoring Alternatives were carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.2.1.11 Planktonic Fish and Invertebrates

4.2.1.11.1 Proposed Action

Construction

Turbidity. Turbidity refers to any insoluble particulate matter suspended in the water column that impedes light passage by scattering and absorbing light energy. Activities that resuspend sediments have the potential to negatively impact early life stages of fish species by preventing successful egg and larvae development (USEPA 1976, Colby and Hoss 2004). Turbidity-related impacts often include reductions in growth and feeding rates, and the clogging of respiratory structures, especially when eggs and larvae are demersal (Berry et al. 2003).

The extent of the turbidity plume generated would depend on the amount of sediment disturbed, the grain size, and weight of the disturbed sediment particles, the techniques employed to install and bury the pipeline, and the ambient current dynamics. Coarser, heavier sediment particles would resettle quickly (e.g., within hours), while finer, lighter sediment particles would remain suspended for longer periods of time (e.g., days). Sediment concentrations can be high initially and decay rapidly with distance.

As indicated in **Section 4.1.1**, turbidity modeling (SSFATE) conducted by the Applicant was used to estimate the area in which sediment concentrations would continue to exceed 100 mg/L after 30 minutes. Under worst-case conditions, is estimated that sediment concentration would exceed 100 mg/L for less than 2 hours (ASA 2008). The turbidity plumes would be short-lived and remain fairly close to their source. The total areal extent of the turbidity plumes created during pipeline installation is estimated to be approximately 1,894 hectares (4,679 acres) (ASA 2008). However, the actual distance from the source would depend on the source (e.g., HDD, dredge) and prevailing conditions (e.g., weather and tide). Impacts on planktonic fish and shellfish are designated as minor because the impacts are expected to be short in duration or localized (in the immediate area of the Port and pipeline). Therefore, short-term, minor, indirect, adverse impacts on planktonic fish and shellfish would occur as a result of turbidity increases associated with the installation of the Port and pipeline.

BMPs discussed in **Section 4.11** are expected to be effective in reducing the magnitude and extent of impacts resulting from sediment suspension during pipeline construction and therefore, the impact of turbidity on planktonic fish and shellfish. However, the performance of the measures should be monitored during construction to verify their effectiveness. Application for variance from turbidity standards would not be effective in reducing adverse impacts, and could, in fact, result in an increase in adverse impacts.

Hydrostatic Test Water Intake and Discharges. Planktonic fish and shellfish would be entrained as a result of hydrostatic testing. The proposed use of approximately 24 million gallons of filtered, surface seawater during flushing and hydrostatic testing of the pipeline would result in the entrainment of plankton fish and shellfish. This would be approximately 0.3 percent of the impact of the seawater intake of the Port in one year. Hydrostatic testing would be expected to occur sometime between May and September, during the construction of the proposed pipeline. The impact on any species that would occur in the Project area during that time of the hydrostatic testing is expected to be similar to impacts of cooling water intake during the same time of year. Impacts on plankton would be minor as a result of pipeline intakes and discharges. As stated in **Section 4.1.1,** discharge of hydrostatic test water would have a short-term, minor, localized impact on water quality. Therefore, short-term, negligible, localized impacts on planktonic fish and shellfish would occur.

Lighting. Planktonic fish and shellfish are attracted to lighting during the night (Hickford and Schiel 1999) and would potentially be attracted to the construction area, making them more vulnerable to predation. Lights would be used to identify construction vessels at night and to illuminate working decks. These lights would not intentionally illuminate surrounding waters. Therefore, potential impacts would be short-term, minor, direct, and indirect. Minor adverse impacts on planktonic fish and shellfish would occur as a result of lighting associated with construction.

Operations

Turbidity. Impacts from turbidity are expected to be extremely localized and in the lower portion of the water column. Long-term, minor, indirect, adverse impacts on planktonic fish and shellfish would occur as a result of turbidity increases associated with chain and riser sweep associated with the operations of the proposed Port.

Lighting. Planktonic fish and shellfish could be attracted to the construction area, making them more vulnerable to predation. Lights would be used on SRVs at night to illuminate working decks. Additionally, the plankton community is highly dynamic (e.g., patchy and highly variable in density over space and time). Due to their reduced motility and the fact they are affected by the circulatory patterns in the GOM, impacts on planktonic fish and shellfish would be temporary and minor.

Seawater Intake and Cooling Water Discharge. While at the Port, two SRVs would use approximately 23.66 MGD of seawater as ballast and cooling water over the course of 4 to 8 days. Seawater intake would be through one of two upper or lower sea chests each measuring 1.5 m by 2.0 m (4.9 feet by 6.56 feet). Average water velocity through the lattice screens at the hull side shell would not exceed 0.15 m/s (0.5 feet/s).

Direct impacts of the seawater intake would include entrainment of fish and invertebrate eggs and larvae passing through the intake screen. For the following assessment, mortality of eggs and larvae in the SRVs' seawater intakes was assumed to be 100 percent. These impacts on fisheries resources and EFH were determined to be minor because the quantitative analysis found impacts were slight, but detectable (minor), when compared to state landings of some species by commercial and recreation fisheries, as described in the following analysis.

The need for quantitative assessment of impacts on ichthyoplankton was recognized during earlier reviews of LNG Deepwater Port project license applications that had proposed to use open-loop vaporization systems. The open-loop vaporization systems that were proposed at that time required seawater intakes several times larger than that proposed for Port Dolphin. USCG and the Maritime Administration worked cooperatively with the NMFS staff and other interested parties to develop an ichthyoplankton assessment methodology that used the SEAMAP database to estimate the number of eggs and larvae that could be entrained by the deepwater ports based on the density of eggs and larvae (number of eggs and larvae in 1 million gallons [3,785 m^3] of seawater) (USCG and MARAD 2004).

Based on the species represented in the SEAMAP data and other considerations, such as the availability of data to construct life histories and whether or not a species had EFH in the area, four species were selected to represent broad categories of the species represented in the data. The four finfish species that were selected are red drum (*Sciaenops ocellatus*), red snapper (*Lutjanus campechanus*), Gulf menhaden (*Brevoortia patronus*), and bay anchovy (*Anchoa* spp.). These species were selected to represent a commercially and recreationally important species with significant impacts from overfishing and extensive restrictions on landings through a Federal FMP (red drum), another important commercial and recreational species that is managed under a Federal FMP (red snapper), a commercially important

species with no recreational importance (Gulf menhaden), and an important prey species with limited commercial importance (bay anchovy).

In comments on the assessments for the projects that had proposed open-loop vaporization systems, NMFS stated their preference for closed-loop vaporization systems, such as the one proposed by the Applicant. The primary mitigation identified by NMFS for open-loop systems was substitution of a closed-loop system. However, in evaluations for subsequent deepwater port projects that proposed closed-loop vaporization systems, an analysis of the potential impacts using the quantitative methodology was still conducted.

Based on discussions with NMFS and the FWC, two additional species were identified for analysis based on the Port location off the coast of western Florida. Gag grouper was selected as a commercially and recreationally important species in the Project area that is managed under a Federal FMP. Sheepshead was selected as a species of concern to Florida that is not managed under a Federal FMP. Other species might have EFH in the Project area or occur in the Project area, but these representative species were selected (in cooperation with NMFS) based on economic and ecological importance, availability of life history data, and the similarity to other population types. However, 217 taxa are identified in the SEAMAP samples at the study area. See **Table 3-1 of Appendix G** for the complete list of taxa caught in samples at the study area. It is assumed that impacts on other species in the Project area would be similar to impacts on these representative species.

The SEAMAP database has a number of limitations including the sampling strategy, the efficiency of sampling equipment, and frequency of sampling. Despite the limitations, SEAMAP data have several advantages for this analysis. The data are readily available. The data have been collected consistently since 1983. These data are also available for the area near Port Dolphin. Therefore, the data and methodology used represent the best available data. A complete description of the data, data limitations, and data analysis is provided in **Appendix G**.

To ensure that actual impacts attributable from Port operations are consistent with this analysis, the license, if issued, would, like other Maritime Administration DWPA licenses issued to date, contain a condition requiring pre- and post construction ichthyoplankton sampling. If ichthyoplankton densities exceed levels specified in the monitoring plan, adaptive management would be required. As noted above, the ichthyoplankton assessment model was developed to assess impacts from open-loop vaporization systems. The principal mitigation recommended by NMFS was use of a closed-loop vaporization system. Port Dolphin LLC has proposed to use a closed-loop vaporization system, therefore impacts on ichthyoplankton and related fisheries would be expected to be minor.

While at the Port, the SRVs' seawater intake systems potentially represent an additional mortality source for fish eggs and larvae. To assess the impact of the SRVs' seawater systems, three parameters were calculated: (1) the number of eggs and larvae potentially entrained annually by the vaporization system, (2) the number of age-1 equivalents potentially lost (annually), and (3) annual equivalent yield. The first parameter, the egg and larval entrainment estimates, is an estimate of the number of eggs and larvae lost during seawater intake. It is used as the basis for evaluating the other parameters. The second and third parameters were calculated using the entrainment estimates and represent a more realistic assessment of potential impacts on fisheries resources.

The second parameter, annual age-1 equivalents, projects forward the number of lost eggs and larvae that would have likely survived to age-1 (had they not been entrained by the seawater intake system). This parameter provides a meaningful way to compare the impacts of seawater intake on different species.

The third parameter, annual equivalent yield, considers mortality to the point that the fish would have entered the fishery (i.e., fish would have been at an age/size that could be legally harvested). Annual equivalent yield estimates were calculated to assess potential stress on fish population and compared to Florida fisheries harvest. It is important to note that equivalent yield estimates do not predict direct losses to fish harvests. For example, an equivalent yield that represents 2 percent of some fishing harvest is equivalent to an additional 2 percent fishing stress on a population when compared to that harvest, not a 2 percent loss of that harvest.

The number of eggs and larvae potentially entrained by the SRVs' seawater intake systems each year is a function of (1) seawater usage, and (2) density of the eggs and larvae in data. Note that annual entrainment estimates are based on total seawater intake of 23.66 MGD. This assumes that there would be an SRV moored to both buoys and vaporizing LNG at all times throughout the year. Since two SRVs would only overlap at the buoys for about a day, a more realistic but still conservative value for average seawater intake would be about 14 MGD. **Table 4.2-23** provides a summary of the number of eggs and larvae (for each representative species) estimated to be entrained by the cooling water systems of SRVs each year. A detailed description of the calculation of annual entrainment estimates is provided in **Section 4 of Appendix G**.

Table 4.2-23. Annual Egg and Larvae Entrainment Estimates (Number of Eggs and Larvae) for the Project

Species	Eggs (Number)	Larvae (Number)
Red drum	1,228	4,384
Red snapper	27,304	97,516
Bay anchovies	100,349	358,388
Gag grouper	47,340	169,073
Sheepshead	1,016,697	3,631,060
Spanish sardines	11,760,069	42,000,246

Source: SEAMAP Data 2002

Annual age-1 equivalent estimates and equivalent yield estimates are calculated based on annual entrainment estimates and life history characteristics (e.g., survival rates of eggs and larvae and adult fish) and mortality related to the commercial and recreational fisheries (for equivalent yield) for each representative species (described in **Appendix G**). The average annual age-1 equivalent and equivalent yield estimates for the representative species are presented in **Table 4.2-24**. A complete description of the calculation of age-1 equivalent and equivalent yield estimates is provided in **Appendix G**. **Table 4.2-25** shows the comparison between the annual equivalent yield estimates and the average total harvest (commercial and recreational) for the State of Florida.

Variability and uncertainty of the assessment of impacts on ichthyoplankton is related to mortality and growth of the early life history stages and the distribution of ichthyoplankton. There are relatively few measurements available for mortality and growth for early life history stages of fish (**Appendix G**, Houde 1987). Available data however, indicate that these rates can be highly variable. Mortality rates used for the assessment are generally based on the average of available estimates (described in detail in **Appendix G**). Larval mortality is thought to vary in relation to water temperature, food availability, and predation. In addition, mortality of early life history is also difficult to measure. Distribution of

Table 4.2-24. Annual Age-1 Average Age-1 Equivalent and Equivalent Yield for Assessed Species

Species	Age-1 Equivalent (Number)	Equivalent Yield (Pounds)
Red drum	4	14
Red snapper	38	45
Bay anchovies	187	N/A
Gag grouper	865	1,363
Sheepshead	680	2
Spanish sardines	0	0

Source: SEAMAP Data 2002

Note: N/A = Not Applicable because the Federal commercial landings are not available for this species.

Table 4.2-25. Average (1990–2006) Florida Commercial and Recreational Landings Associated with the Proposed Action

Species	Florida Commercial Landings (lb)[a]	Florida Recreational Landings (lb)[b]	Total Florida West Coast Landings (lb)	Annual Equivalent Yield as a Percent of Total Florida West Coast Landings
Red drum	0	1,296,070	1,296,070	0.00%
Red snapper	543,030	1,259,195	1,802,255	0.00%
Gag grouper	2,028,612	2,839,046	4,867,658	0.03%
Sheepshead	293,918	1,871,372	2,165,290	0.00%
Spanish sardines	1,433,774	NA	1,433,774	0.00%

Sources: NMFS 2006c and NMFS 2007c

Note: N/A = Not Applicable because the Federal commercial landings are not available for this species.

planktonic fish and shellfish eggs and larvae is both temporally and spatially variable and often occurs in patches. Densities can also be variable. The distribution and abundance of fish eggs and larvae depend on spawning behavior of adults, hydrographic structure and transport on a variety of scales (e.g., vertical stratification and coastal currents), duration of the pelagic period, and behavior of larvae (e.g., vertical migration).

To account for natural variability, annual age-1 equivalents and annual equivalent yield were estimated using the lower and upper 95 percent confidence limits of monthly larval density (based on the ratio-based correction factors for fish species) as the basis for lower and upper entrainment estimates (see **Appendix G** for a full description). The results of the sensitivity analysis based on the lower and upper entrainment estimates for annual age-1 equivalents and equivalent yield under the proposed alternative are presented in **Table 4.2-26**. The upper and lower equivalent yield estimates were compared as a percentage of average (1990 to 2006) Florida commercial and recreational landings in **Table 4.2-27**.

Table 4.2-26. Lower and Upper Annual Age-1 Equivalent and Equivalent Yield Estimates Associated with the Proposed Action

Species	Lower Estimates		Upper Estimates	
	Age-1 Equivalents (Number)	Equivalent Yield (lb)	Age-1 Equivalents (Number)	Equivalent Yield (lb)
Red drum	0	1	3	11
Red snapper	20	24	57	67
Bay anchovies*	81	N/A	295	N/A
Gag grouper	320	504	1,412	2,225
Sheepshead	423	2	938	3
Spanish sardines	0	0	32	0

Source: SEAMAP Data 2002

Notes: N/A = Not Applicable

* Federal commercial landings are not available for this species.

Table 4.2-27. Comparison of Lower and Upper Annual Equivalent Yield Estimates Compared to Average (1990–2004) Florida West Coast Florida Commercial and Recreational Landings for Red Drum and Red Snapper

Species	Lower Estimates	Upper Estimate
	Equivalent Yield as a Percent of Total Florida Landings	Equivalent Yield as a Percent of Total Florida Landings
Red drum	0.00%	0.00%
Red snapper	0.00%	0.00%
Gag grouper	0.01%	0.05%
Sheepshead	0.00%	0.00%
Spanish sardines	0.00%	0.00%

Source: SEAMAP Data 2002

Notes: N/A = Not Applicable

* This species is not fished commercially or recreationally.

Gulf menhaden were not represented in the SEAMAP data because this species spawns from October through March; a time when the SEAMAP data were not consistently collected. It is likely that Gulf menhaden would be entrained by seawater intake associated with the Port. However, egg and larval entrainment is likely to be less than entrainment of Spanish sardines. Data collected by Houde et al. (1979) indicate that *Brevoortia* spp. (the genus that includes Gulf menhaden) occurred at depths of less than 30 meters and that *Brevoortia* spp. were less common than any of the other clupeids (e.g., Spanish sardines), suggesting that concentrations of menhaden are relatively low in the eastern GOM.

Pink shrimp (*Farfantepenaeus duorarum*) eggs are demersal and would not be entrained by seawater intake associated with the Proposed Action. Pink shrimp larvae would occur in the area of the Port and would be entrained from the Proposed Action. Adult pink shrimp spawn in water depths of 3.7 to 47.5 m (12 to 156 feet). They spawn offshore of Tampa Bay in highly saline waters primarily from April through September. The larvae develop at sea and enter into estuarine nursery ground as postlarvae at lengths of

about 8 mm (0.3 inches). Planktonic larvae migrate vertically in the water column. They are located near the bottom during the day and nearer to the surface at night (Mulholland 1984). Therefore, the pink shrimp larvae would be more vulnerable to seawater intake at night.

Based on the lobster's (*Panulirus argus*) life history, the seawater intake associated with the Port is only expected to have a minor impact on lobster. Spawning of spiny lobster in Florida occurs in late April through October in deeper offshore waters (FWRI 2007, Simms 1966). Eggs remain attached to the female and would not be entrained the by seawater intake associated with the Port. Once the larvae, called phyllosomes, hatch, they disperse into the water column and are transported long distances via ocean currents and circulation. It is possible that most phyllosomes are carried away in the Gulf Stream (Simms 1966). Lobster larvae undergo diel migrations and are located near the surface during the day and descend at night. Therefore, the lobster larvae would be more vulnerable to seawater intake at night. Free swimming post-larvae, called pueruli, enter shallow water throughout the year, where they settle into the benthic life stage (FWRI 2007, Simms 1966).

It is evident from the minor impacts on finfish predicted by even the most extreme sensitivity cases that the impacts from the closed-loop vaporization system for the proposed Project would be minor. As stated above, if a license is issued, it would, like other Maritime Administration DWPA licenses issued to date, include conditions requiring pre- and post-construction monitoring to ensure that the assumptions made in the analysis are consistent with actual conditions at the port site. Overall, impacts from cooling and ballast water intake on planktonic fish and shellfish are expected to be long-term, minor, direct, and indirect.

Indirect impacts on fisheries resources and other marine species could occur by impingement and entrainment eggs and larvae in the ballast and cooling water intake. Changes in marine biodiversity affect the food web by causing cascading effects up and down the food chain. The following is a qualitative analysis used to describe minor effects of seawater intake on a hypothetical marine fish food chain. This analysis assumes the following: (1) the average weight of an individual fish egg is 0.0000348 lb and the average weight of an individual fish larvae is 0.000898 lb (these weights are based on the average weights of eggs and larvae of 24 marine species [see **Appendix G**]) (USEPA 2002), and (2) the efficiency of energy transfer between trophic levels (i.e., levels on a food chain) is 10 percent (i.e., consumers gain approximately 10 percent of the weight of the prey consumed, described in more detail below). Based on SEAMAP, an average of 3,398 eggs and 12,084 larvae occur in a million gallons of seawater in the Project area (see **Appendix G**). Based on a seawater intake of 23.66 MGD, approximately 29 million eggs and 104 million larvae would be entrained by the deepwater port each year. Based on the average weight of fish eggs and larvae, a biomass of approximately 1,021 pounds of eggs and 93,712 pounds of larvae would be removed from the food web each year for the life of the proposed Project.

Laboratory and field studies of marine organisms indicate that the average efficiency of energy transfer from one trophic level on the food web to the next trophic level is about 10 percent. In other words, only 10 percent of the energy available at one trophic level is passed on to the next (Sumich 1988). Therefore, a loss of 1,021 pounds of eggs and 93,712 pounds of larvae biomass each year would result in the total annual loss of approximately 9,371 pounds of small planktivorous fish biomass and approximately 937 pounds of large piscivorous fish biomass. This represents a minor loss compared to the total amount of biomass available in the GOM. An estimate of biomass of small pelagic fish is 5.8×10^9 pounds and an estimate of biomass of predator species is 1.3×10^7 pounds (SWFWMD 1999, Brown et al. 1999).

Indirect effects on fish and shellfish larvae could also occur because of the entrainment of phytoplankton and zooplankton, which could also serve as food sources. In the GOM, planktivorous fish that could consume fish eggs and larvae include species such as herrings, anchovies, and sardines (Okey and Mahmoudi 2002). Gelatinous zooplankton such as medusae and ctenophores also feed on fish larvae.

Predatory fish in the GOM include species such tunas, marlins, snappers, sharks, mackerel, grouper, and bluefish. Bottlenose dolphins are also predatory. These species feed on fish and shellfish (Okey and Mahmoudi 2002). All species have fairly broad diets and don't depend on any single species for survival. Because of the relatively low biomass that would be entrained by the Port, the broad diet, and broad availability of organisms in the proposed Project area, indirect impacts on the food web that result from the entrainment of planktonic fish and shellfish eggs and larvae would be expected to be minor.

In addition, long-term, minor, localized impacts on planktonic fish and shellfish would result from the cooling water discharges. Cooling water would be discharged at 10 °C (18 °F) above ambient seawater temperature and would cool to 1 °C (1.8 °F) above ambient temperature within 100 m (328 feet) of the discharge. An increase in temperature could result in adverse impacts on planktonic fish and shellfish in the discharge plume. Because the two cooling water discharge plumes compose a relatively small area, impacts are expected to be minor.

BMPs were proposed by the Applicant to avoid and minimize impacts from the seawater intake and cooling water discharge associated with the operation of the Port.

The use of a closed-loop system would result in a reduction in planktonic fish and larvae entrainment, as compared to an open-loop system.

Hydrocarbon Spills. Impacts on planktonic fish and shellfish communities could occur from hydrocarbon releases at the Port. Based on the amounts of hydrocarbons stored on the SRVs (see **Section 2.3.3**) and the fact that all SRVs are designed with features to minimize the potential for oil spills (see **Section 2.3.10**), the impact is designated as minor and short-term. Planktonic fish and shellfish could be impacted by physical contamination, smothering, and toxic effects of hydrocarbons. Acute effects would most likely result in loss of populations near the release/accident, but no long-term impacts on areawide populations from loss of these individuals is expected. Overall impacts on planktonic fish and shellfish from hydrocarbon spills would be short-term, minor, direct, and adverse.

LNG Spills. Potential impacts would include exposure to low-temperature LNG at the water surface, possibly resulting in frostbite or death, and asphyxiation by natural gas vapors above the surface of the water. These impacts would likely occur in the immediate vicinity of the spill; the timeframe of the impact is limited (see **Section 5**). Acute effects would most likely result in loss of local populations near the release or accident. No long-term impacts on areawide populations would be expected.

BMPs discussed in **Section 4.11** would both help to avoid and reduce the impacts of hydrocarbon and LNG spills, which would reduce potential impacts on planktonic fish and shellfish.

Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would

be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Decommissioning activities could cause the resuspension of sediments and an increase in turbidity. Impacts from these activities are expected to be similar to those discussed for construction and would be temporary in nature and localized in scope (in the immediate area of the Port). Short-term, minor, direct, adverse impacts on planktonic fish and shellfish would occur from Project decommissioning.

4.2.1.11.2 Alternatives

Table 4.2-28 compares impacts from the Proposed Action to each of the alternatives with respect to planktonic fish and shellfish.

Southern Site and Route Alternative. Construction, operation, and decommissioning impacts on planktonic fish and shellfish under the Southern Site Route Alternative would be similar to those under the Proposed Action. Impacts associated with turbidity would be slightly greater because the pipeline route would be longer.

Offshore Interconnection with Gulfstream Pipeline Alternative. Impacts on planktonic fish and shellfish would be less than the Proposed Action under this alternative. Under this alternative the pipeline would not come inshore because of the connection to the Gulfstream pipeline. The connection would occur approximately 16 km (10 mi) from the mouth of Tampa Bay, in water depth of 6 m (20 feet). Turbidity associated with pipeline installation under this alternative would be less under this alternative.

FSRU Port Design Alternatives. Short-term impacts during construction would be lower under this alternative than under the Proposed Action. There are fewer anchors and no flexible riser and under this alternative, seafloor disturbance and turbidity would be lower. Therefore, impacts on planktonic fish and shellfish would also be lower.

Operation impacts on planktonic fish and shellfish under the FSRU Port Design Alternative would be 4.8 times higher than under the Proposed Action. As described in **Section 2.1.3.3**, seawater intake and discharges would be approximately 5 times higher than the Proposed Action. The discharge associated with the FSRU alternative would be fresh water. This discharge would travel a longer distance as a thin layer; therefore, the impacts would be minor.

AAV Alternative. Construction, operation, and decommissioning impacts on planktonic fish and shellfish under the AAV Alternative would be approximately 4.8 times higher than under the Proposed Action. As described in **Section 2.1.3.3**, the cooling and ballast water intake for the AAV Alternative would be approximately 4.8 times higher than for the Proposed Action. The discharge associated with the AAV Alternative would be fresh water. This discharge would travel a longer distance as a thin layer; therefore, the impacts would be minor.

Suction Piles Anchoring Alternative. Construction, operation, and decommissioning impacts on planktonic fish and shellfish under the Suction Piles Anchoring Alternative would be similar to those under the Proposed Action.

No Action Alternative. The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No

Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, no direct or indirect impacts on planktonic fish and shellfish would be expected. Alternative sources of natural gas might include other Deepwater LNG Ports or onshore LNG terminals. Other Deepwater LNG Ports might have impacts on planktonic fish and shellfish that are similar to Port Dolphin, but on different species.

Table 4.2-28. Planktonic Fish and Shellfish Impact Summary

Impact	Proposed Action	Southern Site and Route Alternative	Offshore Interconnect Alternative	FSRU Design Alternative	AAV Alternative
Pipeline construction	Minor, short-term, adverse impacts along pipeline route as a result of turbidity and hydrostatic testing and discharges.	Short-term impacts higher than Proposed Action (longer route).	Short-term impacts lower than Proposed Action (shorter route).	No difference from Proposed Action.	No difference from Proposed Action.
Port construction	Minor, short-term, adverse impacts in the vicinity of the Port as a result of turbidity.	No difference from Proposed Action.	No difference from Proposed Action.	Short-term impacts as a result of turbidity lower than Proposed Action (less anchors and no flexible riser).	Short-term impacts as a result of turbidity lower than Proposed Action (less anchors and no flexible riser).
Operation of Port	Minor, short-term, adverse impacts due to cooling water discharges, routine discharges, and potential LNG/hydrocarbon spills. Long-term impacts due to chain sweep, seawater intake, and marine debris.	No difference from Proposed Action.	No difference from Proposed Action.	Seawater intake and discharges would be approximately 5 times higher than the Proposed Action. Therefore, long-term, adverse impacts on planktonic fish and shellfish would be greater than for the Proposed Action.	Seawater intake and discharges would be approximately 5 times higher than the Proposed Action. Therefore, long-term, adverse impacts on planktonic fish and shellfish would be greater than for the Proposed Action.
Decommission of Port	Minor, short-term adverse impact would be similar to construction of the pipeline and Port. Impacts of decommissioning would be lower than construction.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.

Note:

1. Under the No Action Alternative none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur. No direct or indirect impacts on biological resources would be anticipated.
2. Suction Pile Anchoring Alternatives were carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.2.1.12 Federally Managed Fish and Shellfish

4.2.1.12.1 Proposed Action

Construction

Seafloor Disturbance. Seafloor disturbance (described in **Section 4.2.1.6.1**) associated with construction machinery and the activities and direct placement of the buoy components, pipelines, and concrete mattresses would result in direct adverse impacts on demersal (i.e., bottom-dwelling) fish and shellfish. These impacts would include the displacement of demersal fish (though it is expected that fish would avoid the construction zone due to noise) and the displacement crushing of benthic shellfish such as shrimp, stone crabs, and spiny lobsters. Long-term disturbance and moderate, direct impacts on corals would occur as a result of the crushing associated with pile driving in hard- and live-bottom habitat and installation of the pipeline and concrete mattresses onto hard- and live-bottom habitat. Impacts on corals are designated as long-term because the recovery time for corals to recolonize new substrate would be longer than the mobile, benthic shellfish species. The impacts are designated as moderate because of the lower availability and ecological importance of coral species.

The redeposition of sediment (described in **Section 4.2.1.6.1**) would cause additional short-term minor direct adverse impacts on benthic fish and shellfish (e.g., fish eggs, benthic invertebrates, and benthic prey species) through burial. The effects of burial of benthic invertebrates depend on the species mobility and burrowing ability (SCDNR 1995) (see **Section 4.2.1.6.1**). Lobsters buried in sediments deeper than 30 cm (11.8 in) of material are expected to be killed (Thrush et al. 2003). Because shrimp, spiny lobster, and stone crabs are highly mobile and the depth of deposition of resuspended sediments is not expected to exceed 5 mm, the effects are expected to be minor. As stated above, these species are expected to avoid the construction area due to the noise. Some fish and shellfish species deposit demersal eggs that remain on the bottom until larval hatching. Resource agencies suspect high mortality of eggs by smothering, as a result of sedimentation, and of larvae by clogging or abrasion of gill tissues caused by suspended sediment particles (Colby and Hoss 2004). For example, the viability of winter flounder eggs is reduced by 50 percent when the eggs are buried by as little as one half of one egg diameter, approximately 0.5 mm of sediment (Berry et al. 2003). Note that winter flounder eggs are not found in the GOM. Federally managed species with demersal eggs in the Project area include brown shrimp, white shrimp, pink shrimp, gray triggerfish, mutton snapper, and gray snapper.

Benthic fauna serve as food sources for fish and shellfish; therefore, the disturbance or loss of benthic fauna during construction could result in short-term, minor, indirect, adverse impacts on federally managed fish and shellfish. During and shortly after installation of the buoy array components and the pipeline, adult and juvenile individuals are expected to avoid feeding in the immediate vicinity of the proposed Project. Displaced organisms would likely return to the area shortly after construction activities ceased. Short-term and long-term, minor to moderate, direct and indirect, adverse impacts on demersal (i.e., bottom-dwelling) fish and shellfish would occur as a result of seafloor disturbance caused during the installation of the Port and pipeline.

Turbidity. Turbidity refers to any insoluble particulate matter suspended in the water column that impedes light passage by scattering and absorbing light energy. Decreased light penetration reduces the depth of the photic zone, in turn reducing the depth at which primary productivity could occur. Turbidity adversely affects adult fish and shellfish by direct mortality or reduction of growth rates, modifying migration patterns, reducing available food abundance, in part by reducing primary production, or burial of benthic shellfish.

Direct impacts of turbidity include clogged fish gills, lower growth rates, and impacts on egg and larval development (Berry et al. 2003). Indirect impacts include the reduction of abundance in part by a reduction in prey (e.g., a reduction of zooplankton associated with an increase in turbidity) and a reduction in light reducing foraging or predation success (SCDNR 1995). However, these potential impacts would be spatially limited and short-term in nature, as the suspended sediment would redeposit soon after the buoy system array and pipeline components were installed.

The extent of the turbidity plume generated would depend on the amount of sediment disturbed, the grain size, and weight of the disturbed sediment particles; the techniques employed to install and bury the pipeline; and the ambient current dynamics. Coarser, heavier sediment particles would resettle quickly (e.g., within hours), while finer, lighter sediment particles would remain suspended for longer periods of time (e.g., days). Sediment concentrations can be high initially and decay rapidly with distance.

As indicated in **Section 4.1.1**, turbidity modeling (SSFATE) conducted by the Applicant was used to estimate the area in which sediment concentrations would continue to exceed 100 mg/L after 30 minutes. Under worst-case conditions, is estimated that sediment concentration would exceed 100 mg/l for less than 2 hours (ASA 2008). The turbidity plumes would be short-lived and remain fairly close to their source. The total areal extent of the turbidity plumes created during pipeline installation is estimated to be approximately 1,894 hectares (4,679 acres) (ASA 2008). However, the actual distance from the source would depend on the source (e.g., HDD, dredge) and prevailing conditions (e.g., weather and tide). Further, impacts from the temporary turbidity plume would likely affect a few individuals when compared to overall populations found within the Project area. Although the proposed construction could result in the mortality of eggs and larvae of species that are spawning during construction, the overall impacts on fish populations would be expected to be minor since spawning occurs over broad areas. Overall, turbidity events would be short in duration and localized in scope. Therefore, short-term, minor to moderate, direct and indirect, adverse impacts on demersal and pelagic fish and shellfish could result from sediment displacement and turbidity associated with the proposed installation of the Port and pipeline.

BMPs discussed in **Section 4.11** are expected to be effective in reducing the magnitude and extent of impacts resulting from sediment suspension during pipeline construction and therefore, the impact of turbidity on federally managed fish and shellfish. However, the performance of the measures should be monitored during construction to verify their effectiveness. Application for variance from turbidity standards would not be effective in reducing adverse impacts, and could, in fact, result in an increase in adverse impacts.

Hydrostatic Test Water Intake and Discharges. Hydrostatic testing would require the use of approximately 24 million gallons of filtered, surface seawater (treated with an environmentally benign corrosion inhibitor). This volume includes flooding the pipeline twice, once for flushing and once for hydrostatic testing. Water would be withdrawn from surface waters at a velocity of 0.15 m/s (0.5 feet/s). Pelagic fish would not be expected to be entrained based on this intake rate. Upon completion of the test and flushing, the water would be discharged offshore. The discharge would include an "environmentally benign" treatment chemical (HydroHib P) that is not expected to require any treatment prior to discharge. When HydroHib P is mixed with seawater its characteristic becomes benign and is able to be released back into the environment as a benign substance. HydroHib P has been used for applications similar to Port Dolphin's and none have required treatment prior to release back into the environment. Additionally, the discharge would comply with NPDES permit requirements and is expected to be nontoxic upon discharge (GMFMC 2004). Therefore, no adverse impacts on federally managed fish and shellfish would be expected as a result of pipeline dewatering.

Noise. Impacts of noise on fish can range from mortality to disturbance. Continuous sound exposure and loud sounds can temporarily affect the auditory sensitivity of fish by causing an upward shift in auditory threshold. This effect is known as TTS. The duration of the TTS varies depending on the nature of the stimulus, but by definition, there is generally recovery of full hearing over time (Hastings and Popper 2005). Permanent hearing loss or PTS is caused by acoustic trauma (Hastings and Popper 2005). Other potential impacts of sound exposure on fish include physical damage to the ear region, physiological stress responses, and behavioral responses such as startle response, alarm response, avoidance, and a potential lack of response due to masking of acoustic cues. Most of these impacts are either temporary or intermittent and it is unlikely that they would impact fish at the population level. Federally managed fish and shellfish are mobile and would be expected to avoid the construction area due to the noise. This would minimize potential physiological effects on fish.

Hearing for fish that occur in the GOM ranges from 0.02 kHz through 200 kHz (see **Table 3.2-11**). It is assumed that most fish in the GOM could hear the broadband noise (0.001 to 2 kHz) associated with construction of the deepwater port and pipeline and would be affected by it (see **Table 3.2-6**). It should be assumed that the full range of effects, from PTS, TTS, and disturbance, could occur as a result of project-related noise. It is assumed that fish in the immediate vicinity of pile driving could be killed or experience PTS. It is also assumed that effects would be lessened with distance from pile driving. Noise modeling indicates that broadband noise (0.001 to 2 kHz) could travel up to 20 km (13 mi) at 140 dB re 1μPa for pile driving, up to 3.9 km (2 mi) at 120 dB re 1μPa for buoy installation, up to 7.5 km (5 mi) at 120 dB re 1μPa for pipe laying offshore, up to 6 km (4 mi) at 120 dB re 1 Pa for pipe laying onshore, and up to 1.6 km (1 mi) at 120 dB re 1μPa for pipe laying at Passage Key. Additional detail on noise modeling is presented in **Section 4.8**. Federally managed fish and shellfish are mobile and would be expected to avoid the construction area due to the noise, minimizing the potential physiological effects on fish. Therefore, short-term, minor, direct, adverse impacts on fish and shellfish would result from noise generated by construction and vessel operations and pile driving.

Lighting. Pelagic fish could be attracted to lights, making them vulnerable to predation. According to the BMPs provided by the Applicant, lights used to identify construction vessels and illuminate working decks would be downshielded but would not illuminate surrounding waters. During installation an environmental coordinator would be on site to ensure no violations would occur. Therefore, the potential impacts on pelagic species associated with construction lights would be avoided and no impacts would occur.

Operations

Seafloor Disturbance. Seafloor disturbance would occur as a result of placement of hard parts of the buoy system, placement of concrete mattresses or other protective cover where the pipeline cannot be buried, long-term chain and riser scour, and resettling of suspended sediments associated with the chain and riser sweep. An estimate of each habitat type that would be disturbed is presented in **Table 4.2-1**.

In areas where hard- and live-bottom habitats are being replaced by components of the buoys, pipelines, and concrete mattresses, adverse impacts on fish and shellfish species that use these habitats would occur. As described in **Section 4.2.1.6**, the new substrate would need to be recolonized by structure-forming biota such as sponges, bryozoans, and hard and soft corals. This would result in a reduction in refuge for juvenile reef fish, stone crabs, and spiny lobsters. Any modifications to limestone outcroppings could result in a reduction of rock ledges and structure that are important habitat for many adult reef fish, stone crabs, and spiny lobsters.

In areas where soft-bottom/sand is replaced by hard components such as concrete mattresses, and anchors/piles associated with the buoy, a shift in associated benthic assemblages could occur. This impact would be beneficial for species that prefer hard-bottom structures such as reef fish.

Additional long-term seafloor disturbance would be caused by the sweeping and scouring of benthic substrate by anchor chains/cables. It is likely that mobile fish and shellfish would avoid this area. Impacts would be long-term and minor because of the localized area of the impact. Overall, long-term, minor to moderate, indirect, adverse and beneficial impacts on fish and shellfish species would occur as a result of seafloor disturbance associated with the operations of the proposed Port.

Turbidity. The anchor cables and flexible risers would have the potential to increase turbidity as they sweep along the bottom substrate. These increases would be temporary, as disturbed sediments would be expected to resettle quickly, but they would occur regularly throughout the life of the Project. This could also result in temporary turbidity increases. Turbidity increases would be short-term in nature, localized in scope, and moderate in intensity, throughout the life of the Project. Therefore, impacts on most fish and shellfish species would be minor. Because fish and shellfish species that inhabit that Project area are mobile, long-term or chronic impacts associated with turbidity are expected to be minimized. Overall, long-term, minor, direct, adverse impacts on fish and shellfish could occur as the result of turbidity increases during routine Port operations.

Noise. Noise generated by SRV engine/boiler operations could have negative direct impacts on fish, including EFH species. As discussed under construction noise, potential impacts of sound exposure on fish could include TTS; physical damage to the ear region; physiological stress responses; and behavioral responses such as startle response, alarm response, avoidance, and a potential lack of response due to masking of acoustic cues. Noise from the routine Port operations would be associated with ship transits, the regasification process on the carriers when moored to the Port, and carrier-maneuvering activities at the Port. Because fish and shellfish species are mobile, only behavioral effects would be expected to occur.

Hearing for fish that occur in the GOM ranges from 0.02 kHz through 200 kHz (see **Table 3.2-11**). Most fish in the GOM could hear the broadband noise (noise over a wide range of frequencies) associated with SRV and tug operations. Noise modeling indicates that broadband noise could travel up to 3.9 km (2 mi) at intensities above 120 dB re µPa for SRV transit, up to 3.7 km (2 mi) at intensities above 120 dB re µPa for buoy approach, and up to 7.1 km (4 mi) at intensities above 120 dB re µPa for SRV docking. It is likely that the acoustic transponder (at 30 kHz) would be heard by Gulf menhaden and American shad if present when a ship calls to the proposed Port. These are not federally managed. However, impacts on these species are expected to be negligible. It is likely that the SRV docking on the buoy would disturb the fish prior to any acoustic impacts. It is unlikely that the acoustic transponder would be heard by any federally managed species. Additional detail on noise modeling is presented in **Section 4.8**. Federally managed fish and shellfish are mobile and would be expected to avoid the construction area due to the noise, minimizing the potential physiological effects on fish.

Lighting. Pelagic fish could be attracted to lights, making them vulnerable to predation. There is no way to determine which pelagic fish in the Project area would be susceptible to lights. The lighted buoys would include flashing yellow lights, with an average lighting level of 900 to 1,000 Candelas. Lighting aboard SRVs would be low. Lights would be used at night to identify vessels moored at the unloading buoy and to illuminate working decks. However, the surrounding waters would not be illuminated. Therefore, impacts on pelagic fish species would be minimized. Overall, short-term, minor, indirect, adverse impacts on pelagic fish species would occur as a result of lighting associated with SRV buoy lights.

Seawater Intake and Cooling Water Discharge. The design of the seawater intake is described in **Section 2.1.1.6.** While at the Port, two SRVs would use approximately 23.66 MGD of seawater as ballast and cooling water over the course of 4 to 8 days. Seawater intake would be through one of two upper or lower sea chests each measuring 1.5 m by 2.0 m (4.9 feet by 6.56 feet). Average water velocity through the lattice screens at the hull side shell would not exceed 0.15 m/s (0.5 feet/s).

Both screens on the seawater intake structure and a seawater intake velocity of 0.15 m/s (0.5 feet/s) would prohibit most juvenile and adult fish from being entrained in the seawater intake. Indirect impacts would occur because planktonic fish and shellfish serve as a source of food for some juvenile and adult fish species. While some juvenile fish could become impinged/entrained, it is expected that those numbers would be minor and no impacts on fish populations would be anticipated. Long-term, minor, direct and indirect, adverse impacts on fish and shellfish would result from the seawater intake associated with Port operations.

Cooling water would be discharged at 10 °C (18 °F) above ambient seawater temperature and would cool to 1 °C (1.8 °F) above ambient temperature within 100 m (328 feet) of the discharge. The cooling water discharge is not expected to reach the seafloor. Therefore demersal fish and benthic shellfish would not be affected. An increase in temperature could result in adverse behavioral and physiological impacts on fish. Because the two cooling water plumes compose a relatively small area, impacts are expected to be minor. Additionally, pelagic fish would be expected to avoid the cooling water discharge. Overall, long-term, minor, localized impacts on pelagic fish would result from the cooling water discharge.

Other Routine Discharges. Cooling water discharges and testing of the firefighting system would comply with NPDES permit conditions. While SRVs are present at the Port, they would not discharge domestic waste, bilge water, or ballast water. In addition, on the SRVs, gutter bars would be replaced around equipment where oil leaks could occur (e.g., mooring winches, cranes). Rain water from these areas would be drained to a bilge holding tank. No rain water would be discharged overboard from areas around equipment where oil leaks would occur while at the buoy. The firewater system discharges consist of uncontaminated seawater from testing the firefighting system on the SRVs. Based on the infrequent nature of the discharge, its short duration, and the lack of contaminants, impacts on federally managed fish and shellfish would be expected to be minor.

Marine Debris. The discharge and disposal of garbage and other solid debris from vessels by lessees is prohibited by the MMS (30 CFR 250.300) and the USCG (MARPOL Annex V, Public Law 100-220 [Statute 1458]) (33 CFR Part 151). The discharge of plastics, including ashes from burned plastics, is strictly prohibited and is therefore never authorized. All plastics must be returned to shore, and are tracked. These prohibitions on the discharge and disposal of garbage and other solid debris from vessels would be incorporated as enforceable conditions into the DWPA license. The USCG enforces MARPOL and the Deepwater Port License and fines or penalties could be assessed where laws and regulations are violated. Long-term, minor, direct and indirect, adverse impacts on federally managed fish and shellfish would be expected to occur as a result of the discharge of marine debris, should this occur.

Although the intentional discharge of marine debris is prohibited by law, discharges associated with offshore structures do occur. Sinking marine debris could also have long-term direct impacts on shellfish and indirect impacts on demersal fish by altering substrate composition, interfering with dissolved gas exchange between sediment pore waters, and releasing heavy metals and other toxic substances.

Hydrocarbon Spills. Minor releases of hydrocarbons (e.g., diesel fuel, lubricants) could result in short-term, minor, direct adverse impacts on juvenile and adult fish, including death or chronic effects. The impacts of hydrocarbons are caused by either the physical nature of the oil (physical contamination and

smothering) or by its chemical components (toxic effects and bioaccumulation). It is anticipated that the immediate response reaction of fish would be avoidance.

Minor releases of hydrocarbons could also result in short-term and long-term, indirect, adverse impacts on EFH species from releases and potential spills that might affect their eggs and food sources. The impacts would depend on the depth of the oil spill and the type of oil that is spilled. It is likely that oil spills at the surface would tend not to sink below depths of 20 m (35 feet) (MMS 2002a, 2002b). When oil sinks to depths around 20 m (35 feet), it is at concentrations several orders of magnitude lower than those demonstrated to have an effect on marine organisms (MMS 2002b). Based on the amounts of hydrocarbons stored on the SRVs (see **Section 2.3.3**) and the fact that all SRVs are designed with features to minimize the potential for oil spills (see **Section 2.3.10**), the impact is designated as minor and short-term.

LNG Spills. Large releases of LNG could result in seawater cooling and freezing of surface layers. Potential impacts would include exposure to low-temperature LNG at the water surface, possibly resulting in frostbite or death. These impacts would likely occur in the immediate vicinity of the spill location; the timeframe of the impact is limited (see **Section 5**). This would result in potential short-term, direct, and minor adverse impacts on fish near the surface, through either behavioral avoidance of colder waters or physiological effects. In addition, there could be short-term indirect adverse impacts on fish from releases and potential spills that might affect their eggs and food sources at the surface.

Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Organisms would be displaced and habitat structures could be temporarily disturbed. Displaced fish and shellfish species would likely return to the area shortly after decommissioning activities ceased. As a result, short-term, minor, direct, and adverse impacts would be anticipated. Decommissioning activities would cause localized removal, turnover, and disruption of sediments, which could potentially displace, bury, or crush benthic organisms. As benthic fauna serve as a food source for federally managed fish and shellfish, impacts on benthic communities from decommissioning of the mooring components could cause individual fish and shellfish to avoid feeding in the area for a short period. Displaced fish and shellfish would return to normal feeding life styles within weeks after decommissioning activities cease. Overall, short-term, minor, direct and indirect, adverse impacts on fish and shellfish species would occur during Project decommissioning.

The Applicant indicated that they would not use explosives during decommissioning, which would help to reduce impacts on federally managed fish and shellfish related to noise and direct mortality.

4.2.1.12.2 Alternatives

Table 4.2-29 compares impacts from the Proposed Action to each of the alternatives with respect to federally managed fish and shellfish.

Southern Site and Route Alternative. The impacts on federally managed fish and shellfish associated with construction, operation, and decommissioning under the Southern Site Route Alternative would be similar to those under the Proposed Action. Impacts associated with turbidity would be slightly greater because pipeline route would be longer.

Offshore Interconnection with Gulfstream Pipeline Alternative. Impacts on federally managed fish and shellfish would be less than the Proposed Action under this alternative. Under this alternative the pipeline would not come inshore because of the connection to the Gulfstream pipeline. The connection would occur approximately 16 km (10 mi) from the mouth of Tampa Bay, in water depth of 6 m (20 feet). Turbidity associated with pipeline installation under this alternative would be less under this alternative.

FSRU Port Design Alternatives. Short-term impacts during construction would be lower under this alternative than under the Proposed Action. There are fewer anchors and no flexible riser and under this alternative; seafloor disturbance and turbidity would be lower. Therefore, impacts on federally managed fish and shellfish would also be lower. The discharge associated with the FSRU alternative would be fresh water. This discharge would travel a longer distance as a thin layer; therefore, the impacts would be minor. Impacts on planktonic fish and shellfish related to the increase in seawater intake associated with this alternative are described in **Section 4.2.11.2**.

AAV Alternative. Construction, operation, and decommissioning impacts on federally managed fish and shellfish under the AAV Alternative would be similar to those under the Proposed Action. Impacts on planktonic fish and shellfish related to the increase in seawater intake associated with this alternative are described in **Section 4.2.11.2**.

Suction Piles Anchoring Alternative. Impacts relating to construction noise on federally managed fish and shellfish under the Suction Piles Anchoring Alternative would be lower than under the Proposed Action. Under this alternative, fish and shellfish mortality related to noise would not be expected, because there would be no pile driving. TTS, PTS, and other physical damage to the ear could still occur depending on the level of noise during construction, but would be less likely under this alternative.

No Action Alternative. The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports.

Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, no direct or indirect impacts on federally managed fish and shellfish would be expected. Alternative sources of natural gas might include other Deepwater LNG Ports or onshore LNG terminals. Other Deepwater LNG Ports might have impacts on federally managed fish and shellfish that are similar to the Port Dolphin, but different species would be affected in different geographic locations.

Table 4.2-29. Federally Managed Fish and Shellfish Impact Summary

Impact	Proposed Action	Southern Site and Route Alternative	Offshore Interconnect Alternative	FSRU Design Alternative	Suction Pile Anchoring Alternative
Pipeline construction	Minor, short-term, adverse impacts along pipeline route as a result of seafloor disturbance, turbidity, hydrostatic testing and discharges, and noise. Minor to moderate long-term impacts due to seafloor disturbance and turbidity.	Short-term impacts higher than Proposed Action (longer route).	Short-term impacts lower than Proposed Action (shorter route).	No difference from Proposed Action.	No difference from the Proposed Action
Port construction	Minor, short-term, adverse impacts in the vicinity of the Port as a result of seafloor disturbance, turbidity, and noise. Minor to moderate long-term impacts due to seafloor disturbance and turbidity.	No difference from Proposed Action.	No difference from Proposed Action.	Short-term impacts lower than Proposed Action (fewer anchors and no flexible riser).	Short-term impacts would be lower because pile driving would not be used.
Operation of Port	Minor, short-term, adverse impacts due to lighting, cooling water discharges, routine discharges, and potential LNG/hydrocarbon spills. Long-term impacts due to chain sweep, seawater intake, and marine debris.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.
Decommission of Port	Minor, short-term adverse impacts would be similar to construction of the pipeline and Port. Impacts of decommissioning would be lower than construction.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.

Notes:

1. Under the No Action Alternative none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur. No direct or indirect impacts on biological resources would be anticipated.
2. The AAV Alternative was carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.2.1.13 Essential Fish Habitat

4.2.1.13.1 Proposed Action

The following is written to support the EFH assessment presented in **Appendix H**. EFH for individual species presented below is in **Appendix H, Table 1-1**. The following constitutes the assessment on EFH based on the project components. The impacts on EFH types are also summarized in **Appendix H, Table 1-2**.

- Pink shrimp
- Stone crab
- Spiny lobster
- Red drum
- Red grouper
- Black grouper
- Gag grouper
- Goliath grouper
- Nassau grouper
- Snowy grouper
- Warsaw grouper
- Yellowedge grouper
- Yellowfin grouper
- Yellowmouth grouper
- Red hind
- Rock hind
- Schoolmaster
- Red snapper
- Vermillion snapper
- Gray snapper
- Yellowtail snapper
- Lane snapper
- Blackfin snapper
- Cubera snapper
- Dog snapper
- Mutton snapper
- Hogfish
- Dwarf sand perch
- Greater amberjack
- Lesser amberjack
- Almaco jack
- Banded rudderfish
- Gray triggerfish
- King mackerel
- Spanish Mackerel
- Cobin
- Coral

Construction

Seafloor Disturbance. Approximately 9,272 acres of benthic habitat (composed of soft-bottom/sand and hard- and live-bottom habitat) would be impacted by construction and installation. A detailed description of the benthic habitat that would be affected is presented in **Section 3.2.5**. A detailed description of the impacts on benthic habitat is presented in **Section 4.2.1.6**.

Disturbance on soft sediments would result in short-term, minor, direct, adverse impacts on EFH. Disturbance of limestone outcropping by pile driving or the laying of concrete mattresses would result in long-term moderate impacts on EFH for fish and shelf species that use structure such as rock ledges as habitat. This habitat structure would not recover; however, other limestone outcroppings would be available in the vicinity of the Project area. Native limestone outcroppings occur along the shorelines and in the bays of the west Central Florida coast (ASA 2008). Limestone outcroppings were identified during the Applicant's benthic survey and would be expected to occur similarly throughout the general area. The crushing of benthic epifauna such as bryozoans, sponges, and corals in hard- and live-bottom habitat would result in long-term, moderate adverse impacts on EFH for juvenile and adult fish and shellfish that utilize these benthic invertebrates as structure. This impact is designated as moderate because of the potential for the epifaunal species to recolonize the area, and the conservative assumptions used in estimating the extent of the potential impacts (See **Section 4.2.1.6**). Given the slow growth rates of these species it would take several years for species composition and density to rebound to pre-construction levels. Additionally, the structural component of the habitat would be reduced because the biota such as

corals, sponges, and algae provide structure for juvenile and adult fish and shellfish species in this low relief habitat (Auster and Langton 1998). Typically, invaded habitats have low natural diversity, including areas of anthropogenic disturbance (Ray 2005). See **Section 4.2.1.6** for additional information.

Additional, short-term, minor, direct, adverse impacts on EFH could occur if seafloor disturbance degraded spawning areas during spawning seasons. Short-term impacts could be caused by construction machinery and activities, and could include the displacement of EFH spawning adults and additional impacts on eggs and larvae. Because eggs and larvae in the Project area are primarily planktonic, impacts on these life stages are primarily related to turbidity. These impacts are described in **Section 4.2.1.11.1**. It is assumed that all fish that have EFH in the Project area for eggs or adults would have spawning habitat in the Project area. Federally managed species with EFH in the Project area spawn at various times throughout the entire year. However, the majority spawn in the late spring, summer, and early fall. Some species that spawn throughout the year include pink shrimp, greater amberjack, and cobia (GMFMC 1998, GMFMC 2005).

The redeposition of sediment would cause additional short-term adverse impacts on EFH. The maximum deposit thickness associated with construction is expected to range from 1 mm to 15 mm (depending on the pipeline burial method). Mechanical plow and clamshell dredge would result in a deposition thickness of approximately 4 or 5 mm.

Proper design and implementation of BMPs and mitigation discussed in **Section 4.11**, including compensatory mitigation for impacts on hard bottom, would minimize impacts on EFH from seafloor disturbance from the construction of the pipeline.

Turbidity. Turbidity refers to any insoluble particulate matter suspended in the water column that impedes light passage by scattering and absorbing light energy. In this case turbidity would impact the water column, which is considered EFH for federally managed pelagic and demersal fish. The areal extent of impact on EFH depends on the turbidity plume generated.

The extent of the turbidity plume generated would depend on the amount of sediment disturbed, the grain size and weight of the disturbed sediment particles, the techniques employed to install and bury the pipeline, and the ambient current dynamics. Coarser, heavier sediment particles would resettle quickly (e.g., within hours), while finer, lighter sediment particles would remain suspended for longer periods of time (e.g., days).

As indicated in **Section 4.1.1**, turbidity modeling (SSFATE) conducted by the Applicant was used to estimate the area in which sediment concentrations would continue to exceed 100 mg/L after 30 minutes. Under worst-case conditions, is estimated that sediment concentration would exceed 100 mg/L for less than 2 hours (ASA 2008). The turbidity plumes would be short-lived and remain fairly close to their source. The total areal extent of the turbidity plumes created during pipeline installation is estimated to be approximately 1,894 hectares (4,679 acres) (ASA 2008). However, the actual distance from the source would depend on the source (e.g., HDD, dredge) and prevailing conditions (e.g., weather and tide). Overall, impacts on EFH would be localized in scope and temporary in duration. Therefore, short-term and long-term, minor, direct, adverse impacts on EFH would occur from turbidity associated with the construction and installation of the Port and pipeline.

BMPs found in **Section 4.11** are expected to be effective in reducing the magnitude and extent of impacts resulting from sediment suspension during pipeline construction and, therefore, the impact of turbidity on EFH. However, the performance of the measures should be monitored during construction to verify their effectiveness. Application for variance from turbidity standards would not be effective in reducing adverse impacts, and could, in fact, result in an increase in adverse impacts.

Hydrostatic Test Water Intake and Discharge. The Proposed Action includes approximately 24 million gallons of filtered, surface seawater (which considered EFH) during flushing and hydrostatic testing of the pipeline. The impacts that this would have on fish populations is covered under **Sections 4.2.1.12** and **4.2.1.13**. The impact of the seawater intake on EFH would be minor because it is a one-time temporary event.

As stated in **Section 4.1.1,** the discharge of hydrostatic test water would have a short-term, minor, localized impact on water quality. Therefore, short-term, negligible, localized impacts on EFH would occur.

Noise. Construction activities that result in noise have the potential to adversely impact EFH for all federally managed species by degrading the water column (SCDNR 1995, Colby and Hoss 2004). Pile driving at the proposed buoy locations would generate the loudest noise during construction, as compared to anchoring operations and pipe laying (see **Section 4.8.1.1**). Most of these impacts would be either temporary or intermittent. Federally managed fish and shellfish are mobile and would be expected to avoid the construction area due to the noise from pre-construction and "ramp up" activities (see **Section 4.11**). Overall, short-term, minor, direct, adverse impacts on EFH would result from noise generated by construction and vessel operations and pile driving.

Lighting. According to the BMPs provided by the Applicant, lights used to identify construction vessels and illuminate working decks would be downshielded but would not illuminate surrounding waters. During installation an environmental coordinator would be on site to ensure no violations would occur. However, as described in **Section 4.2.1.12** (federally managed fish and shellfish) impacts are expected to be minor. Pelagic fish could be attracted to lights, making them vulnerable to predation. Overall, short-term, minor, indirect, adverse impacts on EFH for pelagic species would occur as a result of lighting associated with construction.

Operations

Seafloor Disturbance. Seafloor disturbance would occur as a result of placement of hard parts of the buoy system, placement of concrete mattresses or other protective cover where the pipeline cannot be buried, long-term chain and riser scour, and resettling of suspended sediments associated with the chain and riser sweep. An estimate of each habitat type that would be disturbed is presented in **Table 4.2-1**. Overall, long-term, minor to moderate, indirect, adverse, and beneficial impacts on EFH would occur as a result of seafloor disturbance associated with the operations of the proposed Port.

Turbidity. The anchor cables have the potential to increase turbidity as they sweep along the bottom substrate. Increases would be temporary, as disturbed sediments would be expected to resettle quickly, but they would occur regularly throughout the life of the Project. Turbidity would degrade the water column which would be EFH for all species that occur in the area of the Port. Overall, long-term, minor, direct, and adverse impacts on EFH could occur as the result of turbidity increases during routine Port operations.

Noise. Noise generated by SRV engines, boiler operations, the acoustic transponder, and the SRV thrusters during docking and undocking operations would have negative direct, long-term, minor, adverse impacts on EFH. These noises and impacts are described in **Section 4.2.1.13**. Noise would degrade the water column which would be EFH for all species that occur in the area of the Port.

Lighting. Impacts are expected to be minor. The lighted buoys would include flashing yellow lights, with an average lighting level of 900 to 1,000 Candelas. Lighting aboard SRVs would be low. Lights would be used at night to identify vessels moored at the unloading buoy and to illuminate working decks.

Lights on the SRVs would be downshielded but would not intentionally illuminate surrounding waters. All lights would be installed and utilized in accordance with USFWS guidelines (see **Section 4.11**). Overall, lighting associated with the proposed Port operations would result in direct, short-term, minor, direct, adverse impacts on EFH for pelagic fish species.

Seawater Intake and Cooling Water Discharge. While at the Port, two SRVs would use approximately 23.66 MGD of seawater as ballast and cooling water over the course of 4 to 8 days. Seawater intake would be through one of two upper or lower sea chests each measuring 1.5 m by 2.0 m (4.9 feet by 6.56 feet). Average water velocity through the lattice screens at the hull side shell would not exceed 0.15 m/s (0.5 feet/s).

Long-term, minor, direct and indirect, adverse impacts on EFH would result from the ballast and cooling water intake. These are considered primarily through an analysis of direct impacts on planktonic fish and shellfish populations, as discussed in **Section 4.2.1.11**. The design of the seawater intake is described in **Section 2.3**. Both screens on the seawater intake structure and a seawater intake velocity of 0.15 m/s (0.5 feet/s) would prohibit most juvenile and adult fish from being entrained in the seawater intake. The BMPs and their effectiveness are also described in **Section 4.2.1.11**.

Hydrocarbon Spills. The impacts of hydrocarbons are caused by either the physical nature of the oil (physical contamination and smothering) or by its chemical components (toxic effects and bioaccumulation).

Minor releases of hydrocarbons could also result in short-term indirect adverse impacts on EFH species from releases and potential spills that might affect their eggs and food sources. The impacts would depend on the depth of the oil spill and the type of oil that is spilled. It is likely that oil spills at the surface would tend not to sink below depths of 20 m (35 feet) (MMS 2002a, 2002b). When oil sinks to depths around 20 m (35 feet), it is at concentrations several orders of magnitude lower than those demonstrated to have an effect on marine organisms (MMS 2002b).

As described, the minor releases of hydrocarbons (e.g., diesel fuel, lubricants) could result in short-term and long-term, minor, direct adverse impacts on the water column, soft-bottom, and hard- and live-bottom EFH.

LNG Spills. Large releases of LNG could result in seawater cooling and freezing of surface layers. Potential impacts would include exposure to low-temperature LNG at the water surface, possibly resulting in frostbite or death. These impacts would likely occur in the immediate vicinity of the spill location; the timeframe of the impact is limited (see **Section 5**). This would result in potential short-term, direct, and minor adverse impacts on the water column at the surface, through either behavioral avoidance of colder waters or physiological effects. In addition, there could be short-term, indirect, adverse impacts on fish from releases and potential spills that might affect their eggs and food sources at the surface.

BMPs discussed in **Section 4.11** would both help to avoid and reduce the impacts of hydrocarbon and LNG spills, which would reduce potential impacts on federally managed fish and shellfish.

Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Impacts would be similar in nature to those caused by construction and routine Port construction, but would be limited in duration and intensity. No explosives would be used in decommissioning. Short-term, minor, direct and indirect, adverse impacts on EFH would occur during Project decommissioning.

4.2.1.13.2 Alternatives

Table 4.2-30 compares impacts from the Proposed Action to each of the alternatives with respect to EFH.

Southern Site and Route Alternative. The impacts on EFH associated with construction, operation, and decommissioning under the Southern Site Route Alternative would be similar to those under the Proposed Action. Impacts associated with turbidity would be slightly greater because the pipeline route would be longer.

Offshore Interconnection with Gulfstream Pipeline Alternative. Impacts on EFH would be less than the Proposed Action under this alternative. Under this alternative the pipeline would not come inshore because of the connection to the Gulfstream pipeline. The connection would occur approximately 16 km (10 mi) from the mouth of Tampa Bay, in water depth of 6 m (20 feet). Turbidity associated with pipeline installation under this alternative would be less under this alternative.

FSRU Port Design Alternatives. Short-term impacts during construction would be lower under this alternative than under the Proposed Action. There are fewer anchors and no flexible riser and under this alternative seafloor disturbance and turbidity would be lower. Therefore, impact on EFH would also be lower.

Long-term operation impacts on EFH under this alternative would be 4.8 times higher than the Proposed Action. As described in **Section 2.1.3.3**, seawater intake and discharges would be approximately 5 times higher than the Proposed Action. Therefore, long-term, adverse impacts on EFH would be greater than for the Proposed Action. The discharge associated with the FSRU alternative would be fresh water. This discharge would travel a longer distance as a thin layer; therefore, the impacts would be minor.

AAV Alternative. Operation impacts on EFH under the AAV Alternative would be approximately 4.8 times higher than under the Proposed Action. As described in **Section 2.1.7.4**, the cooling and seawater intake for the AAV Alternative would be approximately 4.8 times higher than for the Proposed Action. The discharge associated with the AAV Alternative would be fresh water. This discharge would travel a longer distance as a thin layer; therefore, the impacts would be minor.

Suction Piles Anchoring Alternative. Impacts relating to construction noise on federally managed fish and shellfish under the Suction Piles Anchoring Alternative would be lower than under the Proposed Action. Impacts under this alternative on fish and shellfish mortality related to noise would are addressed under **Section 4.2.1.12.2**.

No Action Alternative. The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, no direct or indirect impacts on EFH would be expected. Alternative sources of natural gas might include other Deepwater LNG Ports or onshore LNG terminals. Other Deepwater LNG Ports might have impacts on EFH that are similar to the Port Dolphin, but different habitats would be impacted in different geographic locations.

Table 4.2-30. EFH Impacts Summary

Impact	Proposed Action	Southern Site and Route Alternative	Offshore Interconnect Alternative	FSRU Design Alternative	AAV Alternative	Suction Pile Anchoring Alternative
Pipeline construction	Minor, short-term and long-term, adverse impacts along pipeline route as a result of seafloor disturbance and turbidity.	Short-term impacts comparable to Proposed Action; somewhat higher long-term impacts (longer route).	Short-term impacts comparable to Proposed Action; lower long-term impacts (shorter route).	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.
Port construction	Minor, short-term, adverse impacts in the vicinity of the Port as a result of seafloor disturbance and turbidity.	No difference from Proposed Action.	No difference from Proposed Action.	Short-term impacts lower than Proposed Action (fewer anchors and no flexible riser). Seawater intake and discharges would be approximately 5 times higher than the Proposed Action. Therefore, long-term, adverse impacts on EFH would be greater than for the Proposed Action.	Seawater intake and discharges would be approximately 5 times higher than the Proposed Action. Therefore, long-term, adverse impacts on EFH would be greater than for the Proposed Action.	Short-term impacts lower than Proposed Action (lower noise levels).
Operation of Port	Minor, short-term, adverse impacts due to cooling water discharges and routine discharges. Long-term impacts due to chain sweep, turbidity, noise, lighting, seawater intake, marine debris, and potential LNG/hydrocarbon spills.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.
Decommission of Port	Minor, short-term and long-term, adverse impacts in vicinity of Port are similar to but lower than port construction impacts.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.	No difference from Proposed Action.

Note:

1. Under the No Action Alternative none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur. No direct or indirect impacts on biological resources would be anticipated.

4.2.2 Terrestrial Resources

4.2.2.1 Wetlands and Vegetation

4.2.2.1.1 Proposed Action

Construction

The number of wetlands along the Proposed Route has been reduced from 11 initially identified in the Draft EIS to 9 with a total crossing length of 2,596 meters (8,516 feet) (see **Table 4.2-31**). This reduction is due to development in the area, unrelated to this Project, and a refined definition of jurisdictional wetlands. It is important to note that Wetland W-5 was recently disturbed and filled (as of May 13, 2008). No portion of this wetland remains in the Project area. Additionally, the FPL borrow pond was originally delineated as Wetland W-4, but according to both the state and Federal rules, a borrow pond constructed in upland habitat is not jurisdictional. Wetlands were identified during field surveys and include any area that satisfies the requirements of the state and Federal methodology for identifying and delineating wetlands.

Construction across wetlands typically would be in accordance with the FERC Procedures and Port Dolphin's project-specific Wetlands and Waterbody Construction and Mitigation Procedures Plan. The FERC Procedures require that noncultivated wetlands be crossed with a ROW width of no more than 75 feet, unless site-specific justification for a wider ROW has been provided by the Applicant and FERC staff has reviewed the request and either approved or denied the wider right-of-way on a case-by-case basis. Port Dolphin originally proposed to cross wetlands in the project area with its standard ROW width for upland construction (i.e., 100 feet). In a response to a FERC data request, Port Dolphin revised its wetland crossing ROW width for several wetlands and provided justification for using a 100-foot ROW for others (see **Table 4.2-31**). FERC staff has reviewed Port Dolphin's proposal and finds it acceptable.

Specific construction procedures include the use of either low-ground weight construction equipment or the use of timber riprap, prefabricated equipment mats, or terra mats for standard excavation equipment, and the installation of erosion-control devices to minimize sediment flow into the wetland. The majority of impacts on the wetlands along the onshore route would be temporary and short-term while pipeline construction is taking place. The estimated time for construction of the pipeline would be approximately 3 months.

A total of 4.82 hectares (11.9 acres) of wetlands would be impacted during the construction and operation phases of the Project. Approximately 4.33 hectares (10.71 acres) of wetland impacts would be minor, short-term, and adverse and recovery measures would be taken to ensure restoration of the wetlands. The only long-term wetland alteration includes the permanent conversion of Forested and Scrub-Shrub wetland habitats to Emergent marsh wetland habitats in the 30-foot (9-meter) permanent ROW. This conversion would be necessary to maintain the operational ROW in accordance with Federal regulations. The operation of the pipeline would result in permanent impacts to 1.19 acres (2.3 percent) of the entire Project area.

Moderate, direct, and long-term adverse impacts on wetlands would consist of the permanent conversion of the forested and shrubby habitat to emergent herbaceous wetlands. This would be necessary to maintain the operational ROW in accordance with Federal regulations. The Applicant has used existing disturbed lands and ROWs to reduce overall impacts on wetlands. The permanent loss of the forested component of the wetland habitat would impact the system's ability to provide valuable wildlife habitat,

however since the forested component is small (1.19 acres), this impact would be expected to be minor.

Table 4.2-31. Acres of Impacts on Wetlands in the Proposed Onshore Route

Wetland	NWI Classification Type [NWI Code]	Acres of Impact from Construction Activities	Length of Crossing (feet)	Width of Construction Corridor (feet)	Justification for 100-foot ROW	Acres of Impact from Operations of the Pipeline
W-1	Estuarine Open Water/ Scrub-Shrub [EOW/SS (3)]	1.88	2,769.4	100	Width of wetland and slope necessitates extra space for two-way equipment travel along one bank.	0.0
W-2	Palustrine Forested/ Scrub-Shrub [PFO/SS]	0.60	505.2	100	Extra space is needed for the safe movement of HDD equipment at the FPL tank farm.	0.35
W-3	Palustrine Scrub-Shrub/Forested [PSS/FO]	1.91	1,224.5	100	The dead end at the end of this area necessitates extra space for the safe turnaround of equipment.	0.84
W-6	Palustrine Emergent/ Scrub-Shrub [PEM/SS]	0.07	120.6	75	Complies with FERC recommended width.	0.00
W-7	Palustrine Scrub-Shrub [PSS]	0.03	22.3	75	Complies with FERC recommended width.	0.00
W-8	Palustrine Scrub-Shrub/Emergent [PSS/EM]	0.15	168.7	75	Complies with FERC recommended width.	0.00
W-9	Palustrine Emergent/ Lacustrine Limnetic Open Water (excavated)[PEM/L1OW (x)]	5.46	3,533.2	100	High-voltage power lines and the FPL tank farm necessitate extra space for two-way equipment travel along one bank.	0.00
W-10	Palustrine Emergent [PEM]	0.37	137.9	75	Complies with FERC recommended width.	0.00
W-11	Palustrine Open Water [POW]	0.24		75	Complies with FERC recommended width.	0.00
Total	-	**10.71**		-	-	**1.19**

Source: Port Dolphin 2008d

The existing forested habitats in the Project area are dominated by exotic species. If native species are successful in revegetating restored areas, the removal of the exotic component of the system would be expected to benefit the habitat as well as the fish and wildlife that could utilize it. The Applicant also would be willing to provide compensatory mitigation for the loss of the forested and shrubby component due to the loss of wetland and wildlife habitat functions that they provide, even though there would be no net loss in wetland acres. (Port Dolphin 2007e).

Compensatory mitigation for the long-term impacts from the Project would be provided through mitigation banks located in close proximity to the proposed Project area. The Applicant has commenced discussions with the Braden River Mitigation Bank. Both forested and herbaceous mitigation are available. The Onshore Post-Construction Recovery and Mitigation Plan provides detailed descriptions of the onshore wetland impacts recovery and mitigation.

Restoration of upland areas would be in accordance with the Project-specific Upland Erosion Control, Revegetation, and Maintenance Plan. The specific recovery plan would address revegetation activities for upland areas.

Operations

Approximately 1.19 acres (0.48 hectare) of wetlands would be impacted from the operation of the pipeline. Permanent impacts from pipeline operations would be expected to occur on Wetlands 2 and 3. However, only a small portion of the wetlands are forested and are dominated by nonnative species. The ROW for the pipeline would prevent trees and some larger shrubs from reestablishing directly over or adjacent to the pipeline. This would not result in a net loss of wetlands, but rather a conversion to emergent or smaller shrub type. Impacts on Wetlands 2 and 3 would be expected to be moderate, long-term, and adverse.

Permanent impacts from pipeline operations would also occur on Wetland 9, the extractive pond Open Water habitat. A permanent levee would be constructed to isolate the area where the proposed pipeline would be placed and the water in the proposed ROW would be pumped out. Therefore, the pipeline would be placed underground, and the water in the ponds would not be restored. These ponds have little to no vegetation and were formed during mining and other extractive activities. Therefore, impacts on these ponds are expected to be minor and short-term.

Proper design and implementation of BMPs and mitigation, including the FERC Procedures, would minimize impacts on wetlands and vegetation during routine operations.

Decommissioning

Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action. Decommissioning activities would result in restrictions similar to those described for the construction process. Due to the in-place abandonment procedures for the pipeline, decommissioning activities are anticipated to take less time than construction.

Impacts associated from decommissioning would be reassessed prior to decommissioning based upon environmental conditions and laws at that time. Aboveground decommissioning of the pipeline would consist of all of the aboveground equipment and the pipe being removed. The underground decommissioning would consist of the removal of any hydrocarbons in the pipe through flushing, filling

the pipe with treated fresh water, capping the ends of the pipe, and burying or covering the ends of the pipeline.

The impacts on wetlands and vegetation from the decommissioning activities would be minor and short-term. Proper design and implementation of BMPs and mitigation, including the FERC Procedures, would minimize impacts on wetlands and vegetation during decommissioning.

Upsets/Accidents. Any upsets or accidents during construction would be handled by an SPCC Plan to respond to spills of any size. Additionally, measures would be taken to minimize any drilling fluid release (or frac-outs) from the HDD construction methodology. Impacts would be minimized in the event of a frac-out as the drilling entry and exit holes have been located away from the sensitive areas. Additionally, the use of nontoxic additives and development of a contingency plan would further minimize impacts. In the event of a frac-out, containment would occur in an expedited manner, resulting in a potential for minor and short-term impacts on the wetland system. All other potential accidents would be mitigated as required by the FERC methodologies.

With the appropriate methods in place, impacts from all potential upsets would be expected to be minor, short-term, and adverse.

4.2.2.2 Freshwater and Terrestrial Wildlife

4.2.2.2.1 Proposed Action

Construction

The only possible fish habitat impacted would be in the south conveyance ditch at Port Manatee, the reservoirs, drainage canals, and the inundated wetland sites. Minimal fishery resources are potentially present in these areas; however, if present, reestablishment of populations is expected following completion of construction and ROW restoration. As a result, minor and short-term impacts would occur on the fish habitat, and thus, impacts on fisheries would be anticipated to be minor, short-term, and adverse.

Most onshore wildlife species in the vicinity of the proposed Project area would be expected to have adapted to the variety of noise levels associated with Port Manatee, local industry, and the maintenance associated with the existing pipeline and would likely move back into the area following the construction.

Adverse, minor, short-term effects would occur on wildlife as a result of temporary noise disturbances associated with the pipeline construction activities. Incidental contact with personnel and equipment could result in trampling or crushing of these species. Moderate, long-term, adverse impacts could occur on less-mobile wildlife from direct physical effects associated with construction activities. BMPs such as stopping construction equipment to allow wildlife to leave the area would minimize the impacts associated with construction.

The impacts on wildlife habitat from the construction of the valve station and the aboveground facilities and loss of habitat would be moderate, permanent, and adverse, but the sites chosen were selected based on prior disturbance of the area, the industrial nature of the area, and the minimal resources present at those locations; therefore, the impacts on wildlife would be minor and short-term.

Fisheries and wildlife habitat would be restored according to the FERC Plan (see **Section 2.3.9**). Proper design and implementation of BMPs and mitigation including the FERC Plan would minimize impacts on wildlife.

Operations

Most onshore wildlife species in the vicinity of the proposed Project area would be expected to have adapted to the variety of noise levels associated with Port Manatee, local industry, and the maintenance associated with the existing pipeline. The area within the ROW corridor would be fully restored to pre-construction conditions according to the FERC Procedures (see **Section 2.3.9**); therefore, no impacts on wildlife would be experienced during the operational phase.

Decommissioning

Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action. Decommissioning activities would result in restrictions similar to those described for the construction process. Due to the in-place abandonment procedures for the pipeline, decommissioning activities are anticipated to take less time than construction.

Minor, adverse, short-term effects would occur on wildlife as a result of temporary noise disturbances associated with the pipeline decommissioning activities. Incidental contact with personnel and equipment could result in trampling or crushing of these species. Adverse, major, long-term impacts could occur on less-mobile wildlife from direct physical effects associated with decommissioning activities. Proper implementation of BMPs, such as stopping construction equipment to allow wildlife to leave the area, would minimize the impacts associated with decommissioning.

Upsets/Accidents. Any upsets or accidents during construction would be handled by contingency planning and development of an SPCC Plan to respond to spills of any size. Such impacts tend to be temporary, and therefore, potential impacts on wildlife would be minor, short-term, and adverse.

4.2.2.3 Threatened and Endangered Species

Section 7 consultation with the USFWS has been initiated to address the existence of suitable habitat and listed species within the proposed onshore route. The BA has been completed and is presented in **Appendix E**. The Applicant conducted a field survey in January 2007 and again in October and November 2007 for the presence of threatened and endangered species.

Federally endangered wood storks were observed foraging in the proposed construction area during the latter surveys. No known rookeries are located in the Project area. The FERC Procedures would address methods for restoring wetland vegetation and functions and values associated with wood stork foraging habitat, therefore, the Port Dolphin project would not be likely to adversely affect the wood stork.

Additional potential federally listed species found in Manatee County include Audubon's crested caracara and the Eastern indigo snake. Neither of these species was observed during the surveys. The proposed onshore pipeline, valve station, and the aboveground facilities do not cross suitable habitat for the caracara, so this species would not be expected to be adversely affected by the proposed Project.

Although the Eastern indigo snake was not observed during the survey, Federal protection measures are presented in **Section 4.11.5** should the snake be observed during construction activities. Two state species of special concern could potentially be found in the proposed construction area. They include the Florida burrowing owl and the Florida gopher frog. A wildlife survey conducted by the Applicant indicated the presence of a gopher tortoise (a state species of special concern) on the property where the

interconnection station would be located. Prior to initiation of construction, additional wildlife surveys would be completed to determine if the gopher tortoise is present. FWC protective measures are presented should any of these species be observed during construction activities. An Environmental Coordinator would be present during construction operations and would follow the required Federal and state guidelines should any listed species be observed.

4.2.2.3.1 Proposed Action

Construction

Potential Federal- and state-listed species in the vicinity of the proposed Project area would be expected to have adapted to the variety of noise levels associated with Port Manatee, local industry, and the maintenance associated with the existing pipeline and would likely move back into the area following the estimated 3 months of construction. Minor, short-term, adverse effects would occur on these species as a result of temporary noise disturbances associated with the pipeline, valve station, and aboveground facilities construction activities.

The following sections describe specific construction impacts for the potential Federal- and state-listed species.

Eastern Indigo Snake. The Applicant would survey for the Eastern indigo snake before construction of the pipeline, valve station, and the aboveground facilities begins. Protective measures would be implemented to avoid the potential impacts on the Eastern indigo snake from direct physical effects associated with construction activities should it be observed during construction activities. Incidental contact with personnel and equipment could result in trampling or crushing of the Eastern indigo snake.

If issued, the license would require the mitigation and monitoring plan following the USFWS Standard Protection Measures (USFWS 2004b) for the Eastern indigo snake be developed prior to construction. The protection measures and BMPs would be incorporated into the plan.

Proper design and implementation of the federally required mitigation and monitoring plan and protection measures would ensure the project would not adversely affect the Eastern indigo snake in the long-term; however, short-term disturbances during onshore pipeline construction could occur if a snake had to be relocated.

Wood Stork. Although wood storks were observed during one of the surveys, rookeries are not known within or adjacent to the proposed construction area, and occasional foraging wood storks in the proposed construction area could leave the active construction ROW with minimal disruption. The FERC Procedures (see **Section 2.3.9**) would address methods for restoring wetland vegetation and functions and values associated with wood stork foraging habitat thus the Project is not likely to adversely affect the wood stork. Proper design and implementation of the required wetland mitigation measures would ensure the Project would not adversely affect the wood stork in the long-term; however short-term disturbances during onshore pipeline construction could occur.

Audubon's Crested Caracara. The proposed onshore pipeline, valve station, and the aboveground facilities do not cross suitable habitat for the caracara, therefore this species is not expected to be affected by the Project.

Gopher Tortoise. The Applicant would survey for the gopher tortoise before construction of the pipeline, valve station, and the aboveground facilities begins. Protective measures would be implemented to avoid the potential impacts on the gopher tortoise from direct physical effects associated with construction

activities for the pipeline, valve station, and aboveground facilities should the tortoise be observed. Incidental contact with personnel and equipment could result in trampling or crushing of an individual or their burrow. The Applicant would survey for active and inactive gopher tortoise burrows before construction begins. If an active gopher tortoise burrow is identified within the proposed path of construction, the Environmental Coordinator would investigate the burrow and acquire the required gopher tortoise relocation permits from FWC. If an inactive burrow is found, a silt fence that is trenched properly would be placed around it to preclude disturbance during construction. After the construction ends, the fence would be removed.

The five FWC options available to address the presence of gopher tortoises on lands slated for development are avoid development, avoid destruction of tortoise burrows, mitigate for incidental take of tortoises, and relocate tortoises on site or relocate them off site. Relocation and incidental take both require permits from the FWC (FWC 2007c).

The Division of Habitat and Species Conservation's Species Conservation Planning Section Tallahassee staff and Regional Biologists issue two types of tortoise relocation permits. The standard tortoise relocation permit is available for development projects which require the relocation of more than five tortoises on site or relocation of any number of tortoises off site. The special tortoise relocation permit is available online for projects which require the relocation of five or fewer tortoises on site. Incidental take permits are issued for activities that impact areas currently occupied by gopher tortoises and to mitigate any accidental impacts on tortoises by providing a degree of habitat protection as outlined in the FWC's Gopher Tortoise Habitat Protection Guidelines. BMPs would include a briefing with construction personnel, and educational materials would be provided and posted on the gopher tortoise. In the event that construction personnel come into contact with a gopher tortoise, all activities would cease until the tortoise has moved away from the area (FWC 2007c) or has been moved from the area using approved FWC means.

Proper design and implementation of the required FWC procedures and BMPs would ensure the Project would not adversely affect the gopher tortoise; however short-term disturbances during onshore pipeline construction could occur.

Florida Burrowing Owl. The Applicant would survey for the Florida burrowing owl before construction of the pipeline, valve station, and the aboveground facilities begins. Protective measures would be implemented to avoid the potential impacts on the Florida burrowing owl from direct physical effects associated with construction activities should the owl be observed. Incidental contact with personnel and equipment could result in trampling or crushing of an individual or their burrow. If a Florida burrowing owl burrow is identified within the proposed path of construction, the Environmental Coordinator would investigate the burrow and contact the FWC. Protection criteria for nonurban situations or situations where numerous burrows would be impacted are addressed by the FWC on a case-by-case basis (FWC 2007a).

BMPs would include a briefing with construction personnel and educational materials on the owl would be provided and posted. In the event that construction personnel come into contact with an owl, all activities would cease until it has moved away from the area or has been moved from the area using approved means.

Proper design and implementation of the required FWC procedures and BMPs would ensure the Project would not adversely affect the Florida burrowing owl; however, short-term disturbances during onshore pipeline construction could occur.

Florida Gopher Frog. The Applicant would survey for the Florida gopher frog before construction of the pipeline, valve station, and the aboveground facilities begins. Protective measures would be implemented to avoid potential impacts on the Florida gopher frog from direct physical effects associated with construction activities should the frog be observed. The Florida gopher frog is not active during the day, except during the spring when it moves to ponds for mating. Incidental contact with personnel and equipment could result in trampling or crushing of an individual or their burrow. If a Florida gopher frog burrow is identified within the proposed path of construction, the Environmental Coordinator would investigate the burrow and contact the FWC. Protection criteria and permitting by the FWC is on a case-by-case basis (FWC 2007c).

BMPs would include a briefing with construction personnel and educational materials on the Florida gopher frog would be provided and posted. In the event that construction personnel come into contact with a frog, all activities would cease until it has moved away from the area or has been moved from the area using approved means.

Proper design and implementation of the required FWC procedures and BMPs would ensure the Project would not adversely affect the Florida gopher frog; however, short-term disturbances during onshore pipeline construction could occur.

Table 4.2-32 provides a list of state and federally listed species potentially impacted by the proposed onshore pipeline route.

Operations

Most potential Federal- and state-listed species in the vicinity of the proposed Project area would be expected to have adapted to the variety of noise levels associated with Port Manatee, local industry, and the maintenance associated with the existing pipeline. The area within the ROW corridor would be fully restored to pre-construction conditions according to the FERC Procedures (see **Section 2.3.9**); therefore, no impacts on potential Federal- and state-listed species would be experienced during the operational phase.

Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Table 4.2-32. Terrestrial State and Federally Listed Species Potentially Occurring Near the Revised Proposed Onshore Route

Common Name	Scientific Name	Federal Status	State Status	Likelihood of Occurrence Resulting in an Impact
Mammals				
Florida mouse	*Peromyscus floridanus*		SSC	Not likely, species is mobile
Birds				
Audubon's crested caracara	*Caracara cheriway*	T	T	Not likely, species is mobile
Brown pelican	*Pelecanus occidentalis*		SSC	Not likely, species is mobile
Florida burrowing owl	*Speotyto cunicularia floridana*		SSC	Possible, site-specific surveys conducted and none observed
Little blue heron	*Egretta caerulea*		SSC	Not likely, species is mobile
Peregrine falcon	*Falco peregrinis*		E	Not likely, species is mobile
Roseate spoonbill	*Platalea ajaja*		SSC	Not likely, species is mobile
Snowy egret	*Egretta thula*		SSC	Not likely, species is mobile
Southeastern American kestrel	*Falco sparverius paulus*		T	Not likely, species is mobile
Tricolor heron	*Egretta tricolor*		SSC	Not likely, species is mobile
White ibis	*Eudocimus albus*		SSC	Not likely, species is mobile
Wood stork	*Mycteria americana*	E	E	Not likely, species is mobile
Reptiles				
American alligator	*Alligator mississippiensis*		SSC	Not likely, species is mobile
Eastern indigo snake	*Dymarchon corais couperi*	T	T	Not likely, species is mobile
Gopher tortoise	*Gopherus polyphemus*		SSC	Possible, any individuals would be relocated
Amphibians				
Florida gopher frog	*Rana capito*		SSC	Possible, commensal with gopher tortoises; any individuals would be relocated

Source: USFWS 2007a, FNAI 2007, Rogers et al. 1996, Ashton and Ashton 1981

Notes: T = Threatened; E = Endangered; SSC = Species of Special Concern

Most potential Federal- and state-listed species in the vicinity of the proposed Project area would be expected to have adapted to the variety of noise levels associated with Port Manatee, local industry, and the maintenance associated with the existing pipeline and would likely move back into the area following decommissioning of the pipeline.

Minor, short-term, adverse effects would occur on potential Federal- and state-listed species as a result of temporary noise disturbances associated with the pipeline decommissioning activities. See **Section 4.2.2** for more information on each of the potential Federal- and state-listed species. Decommissioning activities and procedures related to listed species would be similar to those presented for construction activities. Proper design and implementation of the required FWC procedures and BMPs would ensure decommissioning activities would not adversely affect Federal- and state-listed species.

Upsets/Accidents. Any upsets or accidents during construction would be handled by contingency planning and development of an SPCC Plan to respond to spills of any size. Such impacts tend to be temporary, and therefore, potential impacts on Federal- and state-listed species would be minor, short-term, and adverse.

4.2.2.4 Alternatives

Table 4.2-33 compares impacts from the Proposed Action to each of the alternatives with respect to terrestrial biological resources.

Southern Site and Route Alternative. The location of the onshore pipeline route, valve station, and aboveground facilities for the Southern Site and Route Alternative would be the same for the Proposed Action. Impacts presented and discussed for the Proposed Action would be the same for impacts associated with the Southern Site and Route Alternative.

Offshore Interconnection with the Gulfstream Pipeline Alternative. If the Offshore Interconnection with the Gulfstream Pipeline Alternative was chosen, the onshore pipeline, valve station, and aboveground facilities would not be constructed. No additional impacts other than the existing impacts associated with the operation and decommissioning of the existing onshore Gulfstream Pipeline would occur.

FSRU Port Design Alternative. The location of the onshore pipeline route, valve station, and aboveground facilities for the FSRU Port Design Alternative would be the same for the Proposed Action. Impacts presented and discussed for the Proposed Action would be the same for impacts associated with the FSRU Port Design Alternative.

AAV Vaporization Alternative. Construction, operation, and decommissioning impacts on terrestrial biological resources under the AAV Vaporization Alternative would be similar to those under the Proposed Action.

Suction Piles Anchoring Alternative. Construction, operation, and decommissioning impacts on terrestrial biological resources under the Suction Piles Anchoring Alternative would be similar to those under the Proposed Action.

No Action Alternative. The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, no direct or indirect impacts on coastal and marine or terrestrial resources would be expected. Means to satisfy the Nation's energy demands might result in increased use of existing land-based terminals, greater reliance on declining domestic oil and gas resources, or development of alternate means of importing LNG. Alternative sources of natural gas can include other Deepwater LNG Ports or onshore LNG terminals. Other Deepwater LNG Ports could have adverse impacts on terrestrial resources, but in a different geographic location. Onshore LNG terminals can be located in coastal areas where there would be greater likelihood of adversely impacting terrestrial resources.

Table 4.2-33. Terrestrial Biological Resources Impacts Summary

Impact	Proposed Action	Southern Site and Route Alternative	FSRU Design Alternative
Wetlands			
Pipeline Construction	Minor, short-term, adverse impacts on 10.71 acres.	No difference from Proposed Action.	No difference from Proposed Action.
Operation of Pipeline	Moderate, long-term, adverse impacts on 1.19 acres.	No difference from Proposed Action.	No difference from Proposed Action.
Decommission of Pipeline	Minor, short-term, adverse impacts.	No difference from Proposed Action.	No difference from Proposed Action.
Accidents/Upsets	Minor, short-term, adverse impacts.	No difference from Proposed Action.	No difference from Proposed Action.
Vegetation			
Pipeline Construction	Minor, short-term, and long-term, adverse impacts.	No difference from Proposed Action.	No difference from Proposed Action.
Operation of Pipeline	Minor, short-term, adverse impacts.	No difference from Proposed Action.	No difference from Proposed Action.
Decommission of Pipeline	Minor, short-term, adverse impacts	No difference from Proposed Action.	No difference from Proposed Action.
Accidents/Upsets	Minor, short-term, adverse impacts	No difference from Proposed Action.	No difference from Proposed Action.
Fisheries			
Pipeline Construction	Minor, short-term, adverse impacts.	No difference from Proposed Action.	No difference from Proposed Action.

Impact	Proposed Action	Southern Site and Route Alternative	FSRU Design Alternative
Onshore Wildlife			
Pipeline Construction	Minor to moderate, short-term and long-term, adverse impacts as a result of mortality. Minor, short-term, adverse impacts from noise.	No difference from Proposed Action.	No difference from Proposed Action.
Valve Station and Aboveground Facilities Construction	Minor to moderate, short-term and long-term, adverse impacts as a result of mortality. Minor, short-term, adverse impacts from noise.	No difference from Proposed Action.	No difference from Proposed Action.
Operation of Pipeline	No impacts.	No difference from Proposed Action.	No difference from Proposed Action.
Decommission of Pipeline	Minor, short-term, adverse impacts from construction and noise.	No difference from Proposed Action.	No difference from Proposed Action.
Accidents/Upsets	Minor, short-term, adverse impacts	No difference from Proposed Action.	No difference from Proposed Action.
Threatened and Endangered Species			
Construction of Pipeline	Minor, short-term, adverse impacts from construction noise.	No difference from Proposed Action.	No difference from Proposed Action.
Operation of Pipeline	No impacts.	No difference from Proposed Action.	No difference from Proposed Action.
Decommission of Pipeline	Minor, short-term, adverse impacts from noise.	No difference from Proposed Action.	No difference from Proposed Action.
Accidents/Upsets	Minor, short-term, adverse impacts	No difference from Proposed Action.	No difference from Proposed Action.

Notes:

1. Under the No Action Alternative none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur. No direct or indirect impacts on terrestrial biological resources would be anticipated.
2. The Offshore Interconnection Alternative was carried forward but not presented in the table since no impacts on terrestrial biological resources would be anticipated.
3. AAV Vaporization, and Suction Pile Anchoring Alternatives were carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.3 Cultural Resources

Section 106 of the NHPA, as amended, requires USCG to take into account the effects of its undertakings on properties listed in, or eligible for listing in, the NRHP. Section 106 also requires the USCG to afford the ACHP with an opportunity to comment on those undertakings.

The following discussion of cultural resources impacts includes an analysis of impacts and a determination of impact duration and severity. Included in the discussion are elements of the project description that could cause impacts as well as mitigation measures proposed to minimize potential impacts. Applicant-proposed measures for minimizing potential environmental impacts are those that have been committed to by the Applicant and incorporated into the project design, and are listed in **Section 4.** If further measures are recommended by agencies to mitigate potential adverse impacts, they are stated at the end of each analysis and in **Section 4.11**. For analyses where no mitigation measures are stated, none have been identified to further reduce potential adverse impacts.

4.3.1 Impacts of the Proposed Action

Onshore

The onshore portion of the Project would include a 6.4-km (4-mi) interconnect from the landfall at Port Manatee to the Gulfstream Natural Gas System LLC pipeline system and the TECO Bayside Gate System. The construction corridor for the pipeline would be 30 m (100 feet) wide to encompass work space. The Gulfstream interconnection station parcel is adjacent to the Gulfstream parcel and measures 3 acres. The onshore Port Manatee valve station is 0.07 acres and would be located just east of the Gulfstream valve station within Port Manatee property. Staging areas, a pipeyard, a concrete batch plant, and a storage facility would be located within Port Manatee.

Archeological surveys of the Project's APE have not resulted in the identification of any archeological sites or historic structures that are eligible for listing in the NRHP. It is anticipated that additional workspace, and staging areas might be necessary during construction; such areas would be surveyed and identified archeological sites would be avoided. Port Dolphin indicated it would use only existing access roads or ROW for access.

Offshore

The marine portion of the Project includes offshore and nearshore elements. Construction of the offshore element involves installation of North and South LNG buoy moorings comprising the Port, anchors, feeder lines, and a segment of connecting 36-inch diameter pipeline that together encompass an approximately 22-acre area on the seafloor within Federal waters. Construction of the nearshore element would involve installation of an approximately 42-mile-long pipeline from the Federal-State waters boundary approximately 29 miles west-southwest of the entrance into Tampa Bay, Florida, to an HDD landfall between the existing Gulfstream Pipeline and the Port Manatee Shipping Channel in southeastern Tampa Bay at Port Manatee.

Archeological field surveys utilizing a marine magnetometer, high-resolution side-scan sonar, and sub-bottom profiler and subsequent data evaluation performed for the Project identified high-probability areas for containing prehistoric archeological resources and remote sensing targets with potential for representing historic shipwreck remains. Specifically, the geophysical survey conducted by SEARCH identified areas in the west-central portion of the mooring area as having high probability for prehistoric archeological sites, as well as 11 sonar contacts (3 in Federal waters, 8 in Florida waters), 3 unidentified side-scan sonar contacts (1 in Federal waters), and 15 unidentified magnetic anomalies (all but 1 in Florida waters) interpreted as possible historic shipwreck remains. Based on the results and recommendations from the Project archeological assessment surveys, the proposed Port Dolphin LNG system would be constructed, operated, and decommissioned to avoid adverse impacts on the identified archeologically sensitive areas, and, therefore, would have no potential for causing adverse effects on archeological resources that are listed in or eligible for listing in the NRHP. Furthermore, in the event of unanticipated discovery of cultural resources, Port Dolphin would follow an Unanticipated Discoveries Plan (see **Appendix I**), including stopping work as appropriate and notifying appropriate authorities.

4.3.1.1 Construction

Onshore

Pipeline construction would have little potential for adverse impacts on cultural resources provided that an archeological survey of any unsurveyed areas, as noted below, is performed prior to construction, and all identified cultural resources are avoided with proper buffer distances. The Applicant would also

complete all outstanding consultation regarding the Project with the Florida Division of Historic Resources (FDHR) and federally recognized Native American tribes. Federally recognized tribes have a role in NHPA compliance actions in terms of review and comment. The NHPA requires the identification and consideration of potential adverse effects on properties that might be significant due to their traditional or historic importance to federally recognized tribes.

Interconnection Stations, Valve Station, and Work Spaces. Surveys conducted within the TECO and Gulfstream Interconnection stations and the TECO Bayside Gate station did not encounter any evidence for archeological sites. Surveys of the pipeline corridor resulted in the identification of two AOs within the APE; both have been found not eligible by the SHPO. The two historic structures identified within one-half mile of the Port Dolphin pipeline corridor (8MA1210 and 8MA1211) have been determined not eligible for listing on the NRHP. The third recorded structure (8MA1324) has not been evaluated for eligibility. This third structure lies more than one-half mile southeast of the TECO Interconnection Station and the TECO Bayside Gate station, and more than 1 mile southwest of the Gulfstream Interconnection Station. Although these stations include aboveground structures, they would be located sufficiently far away from 8MA1324 to eliminate visual intrusion into the viewshed or setting of this structure. No historic structures were identified within the APE.

It is anticipated that several workspaces, and staging and pull out areas would extend beyond the 61-m-(100-foot-) wide survey corridor. The precise parameters and locations of these facilities are not yet known. Therefore, the FERC staff has recommended that the Applicant defer construction and use of the onshore facilities and staging, storage, and temporary work areas until the Applicant consults the Florida SHPO regarding the need for survey of any newly identified pullouts, staging areas, extra workspaces, and pipe and contractor yards; and files the SHPO's comments, any required survey reports, and the SHPO's comments on the reports. All material filed with the Commission containing location, character, and ownership information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering as follows: **"CONTAINS PRIVILEGED INFORMATION--DO NOT RELEASE."**

Offshore

Offshore construction activities (deepwater port and pipeline installation and construction barge anchoring operations) have the potential for direct and indirect, temporary and permanent adverse impacts on prehistoric and historic cultural resources in the Project's marine APE. Direct adverse impacts could include the physical destruction or damage to all or a portion of a site, or alteration or removal of a historic property. Indirect adverse impacts could include the introduction of elements that diminish the integrity of the site or alter settings associated with historic properties. Construction impacts resulting from the installation of the 36-inch submarine gas transmission pipeline through conventional trenching using anchor barges and concrete mattresses, installation of the piggable-Y and flow-lines, and the anchoring of support vessels would have the potential to cause significant long-term, adverse impacts on archeologically sensitive areas identified within the marine Project APE. The archeological survey reports (LAI 2006, LAI 2007, SEARCH 2008) for the proposed Deepwater Port and marine pipeline routes have reviewed and identified from the survey data and research archeologically sensitive areas for which avoidance by a distance of 305 m (1,000 feet) is recommended to prevent or minimize Project-related adverse impacts on these areas. Avoidance of archeologically sensitive areas by a distance of 305 m (1,000 feet) is anticipated to mitigate both direct and indirect adverse project impacts to less than significant levels.

4.3.1.2 Operations

Onshore

Operation of the Project would have no impact on cultural resources, as all cultural resources would have been identified for onshore sections of the pipeline and ancillary facilities prior to the in-service date. Routine maintenance on existing facilities would not result in any new impacts.

Offshore

Once the port components are installed, operation of the Port Dolphin project would have no impact on cultural resources since no new areas of seafloor would be impacted by routine operational activities. The only potential impacts of operation that could occur are those from the anchoring of support vessels within the offshore archeologically sensitive areas designated as avoidance zones. Designation of protective buffer zones of 305 m (1,000 feet) around archeologically sensitive areas would mitigate adverse project impacts associated with support vessel anchoring.

4.3.1.3 Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Onshore

Abandonment of the pipeline facilities would be subject to the approval of the FERC under Section 7(b) of the NGA. The impacts would be reassessed prior to the decommissioning based upon environmental conditions and laws at the time. No adverse impacts on cultural resources would be expected as a result of decommissioning.

Offshore

The impacts would be reassessed prior to the decommissioning based upon environmental conditions and laws at the time. Decommissioning of the Port Dolphin project could have adverse impacts on cultural resources (e.g., anchoring of decommissioning support vessels). To prevent adverse impacts from decommissioning activities, 1,000-foot radius avoidance zones centered on areas identified as archeologically sensitive should be designated by the Applicant, and direct or indirect disturbances, such as those occurring from support vessel anchoring within them.

4.3.2 Alternatives

Table 4.3-1 compares impacts from the Proposed Action to each of the alternatives with respect to cultural resources.

4.3.2.1 Southern Site and Route Alternative

Onshore

Surveys conducted within the APE for onshore portion of the Southern Pipeline Alternative encountered two archeological sites and four AOs. Site 8MA1228, recorded during a survey by Janus Research in 2001, consisted of a single lithic flake. The FDHR has concurred that this site is not eligible for listing in the NRHP. Site 8MA1478 and AOs 1 through 4, all of which were recorded during the 2007 SEARCH survey, were recommended as not eligible for listing in the NRHP, and FDHR concurred with this recommendation on June 5, 2007 (see **Appendix C**). Surveys would need to be completed for any unsurveyed portions of the planned pipeline, staging areas, and access roads.

No historic structures lie within the APE for the Southern Pipeline Route. Three recorded historic structures occur within one-half or more miles of the proposed Southern Pipeline Route; two have been determined not eligible for listing on the NRHP and one has not been evaluated (8MA1324). Even should 8MA1324 be determined eligible at a later date, construction of an underground pipeline would represent only a temporary impact on the viewshed or setting of this structure.

Offshore

The Southern Site and Route Alternative would have an offshore pipeline length of 74 km (46 mi) and a construction footprint that is 9,323 acres in size. The offshore construction method would involve conventional trenching using anchor barges and concrete mattresses where necessary. Construction of the alternative would have no direct or indirect impacts on cultural resources provided that an archeological survey of any unsurveyed portions of the route is performed prior to construction, and all identified cultural resources are avoided with proper buffer distances. The Applicant would also complete all outstanding consultation regarding the Project with the USCG, FDHR, and federally recognized Native American tribes.

4.3.2.2 Offshore Interconnection with the Gulfstream Pipeline Alternative

Onshore

With the use of this alternative, which would connect the Port with an existing natural gas pipeline and eliminate the need for an onshore pipeline, onshore construction would not occur. Therefore, impacts on onshore cultural resources would be reduced by use of this alternative.

Offshore

The proposed Site and Interconnect to the Existing Gulfstream Pipeline Alternative would require construction of a 29-km (18-mi) pipeline interconnect to the Gulfstream Pipeline with a 249-acre construction footprint. Installation of the pipeline would require conventional trenching using anchor barges and concrete mattresses where necessary, with HDD or boring under sensitive areas. Construction of the alternative would have no direct or indirect impacts on cultural resources provided that an archeological survey of any unsurveyed portions of the route is performed prior to construction, and all identified cultural resources are avoided with proper buffer distances. Furthermore, in the event of

unanticipated discovery of cultural resources, Port Dolphin would follow an Unanticipated Discoveries Plan (see **Appendix I**), including stopping work as appropriate and notifying appropriate authorities. The Applicant would also complete all outstanding consultation regarding the Project with the USCG, FDHR, and federally recognized Native American tribes as required by the NHPA.

4.3.2.3 FSRU Port Design Alternative

Onshore

Onshore impacts would be the same for the FSRU alternative since the interconnection pipeline would be the same.

Offshore

Anticipated impacts associated with construction, operation, and decommissioning of the FSRU Port Design Alternative would likely be lower than those of the proposed SRV port configuration, because a single set of anchors is required for the FSRU to support continuous vaporization and send-out of natural gas, while an SRV system requires two sets of anchors to allow simultaneous operation of two SRVs while one is shutting down and the other is starting up. Results and recommendations from the Project archeological assessment surveys would need to be considered to construct, operate, and decommission the FSRU Port in such a way as to avoid identified archeologically sensitive areas, thereby eliminating or mitigating potential adverse effects on archeological resources that are listed in or eligible for listing in the NRHP.

4.3.2.4 AAV Vaporization Technology Alternative

Construction, operation, and decommissioning impacts under the AAV Vaporization Technology Alternative would be similar to those under the Proposed Action.

4.3.2.5 Suction Piles Anchoring Alternative

Construction, operation, and decommissioning impacts under the Suction Piles Anchoring Alternative would be similar to those under the Proposed Action.

4.3.2.6 No Action Alternative

The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is

possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, there would be no direct or indirect adverse impacts on submerged or onshore cultural resources. Means to satisfy the Nation's energy demands might result in increased use of existing land-based terminals, greater reliance on declining domestic oil and gas resources, or development of alternate means of importing LNG. Alternative sources of natural gas can include other Deepwater LNG Ports or onshore LNG terminals. Other Deepwater LNG Ports could have adverse impacts on cultural resources, but in a different geographic location. Onshore LNG terminals can be located in coastal areas where there would be greater likelihood of adversely impacting cultural resources.

Table 4.3-1. Summary of Impacts on Cultural Resources

Impacts	Proposed Action	Southern Site and Route Alternative	Offshore Interconnection Alternative	FSRU Design Alternative
Construction				
Onshore Archeological Resources	No adverse impacts from known project components. Possible adverse impacts resulting from construction of unidentified, work areas.	Similar to Proposed Action.	No onshore component, no impact.	No onshore component, no impact.
Aboveground Historic Structures	No adverse impacts from known project components. Possible temporary impacts resulting from construction of unidentified, work areas.	Similar to Proposed Action.	No onshore component, no impact.	No onshore component, no impact.
Submerged Archeological Resources	No adverse impacts.	Similar to Proposed Action; higher risk of unanticipated cultural discovery (longer route).	Similar to Proposed Action; lower risk of unanticipated cultural discovery (shorter route).	Similar to Proposed Action.
Operations				
Onshore Archeological Resources	No adverse impacts.	Similar to Proposed Action.	No onshore component, no impact.	No onshore component, no impact.
Aboveground Historic Structures	No adverse impacts.	Similar to Proposed Action.	No onshore component, no impact.	No onshore component, no impact.
Submerged Archeological Resources	No adverse impacts.	Similar to Proposed Action.	Similar to Proposed Action.	Similar to Proposed Action.
Decommissioning				
Onshore Archeological Resources	No adverse impacts.	Similar to Proposed Action.	No onshore component, no impact.	No onshore component, no impact.
Aboveground Historic Structures	No adverse impacts.	Similar to Proposed Action.	No onshore component, no impact.	No onshore component, no impact.
Submerged Archeological Resources	No adverse impacts.	Similar to Proposed Action; higher risk of unanticipated cultural discovery (longer route).	Similar to Proposed Action; lower risk of unanticipated cultural discovery (shorter route).	Similar to Proposed Action.

Notes:

There would be no impacts from the No Action Alternative.

The AAV Vaporization and Suction Pile Anchoring Alternatives were carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.4 Geological Resources

The following discussion of geological resources impacts includes an analysis of impacts and a determination of impact duration and severity. Included in the discussion are elements of the project description that would both produce impacts and are proposed to minimize potential impacts. Applicant-proposed measures for minimizing potential environmental impacts are those that have been committed to by the Applicant and incorporated into the project design, and are listed in **Section 4.11**. If further measures are recommended by agencies to mitigate potential adverse impacts, they are stated at the end of each analysis and in **Section 4.11**. For analyses where no mitigation measures are stated, none have been identified to further reduce potential adverse impacts.

Protection of unique geological features, minimization of soil erosion, and the siting of facilities in relation to mineral resources and potential geologic hazards are considered when evaluating potential impacts of the Port Dolphin project on geological resources. Generally, impacts on geological resources or caused by geologic hazards can be avoided or minimized through proper siting, foundation and structural engineering design, erosion-control measures, and construction/operation techniques. The main geologic hazards that might occur on the offshore component of the Project include the following:

- Faults – sediment tectonics
- Slope Stability – slope steepening, slumps, creep, debris flow
- Shallow Gas in Sediments – strength reduction, hydrates (frozen gas and water)
- Seafloor Depressions – blowouts, pockmarks
- Seafloor Feature – sediment waves, man-made structures.

Analysis of potential impacts associated with geological resources typically includes the following steps:

- Identify and describe the geological resources that could potentially be impacted or affect the proposed development
- Examine the Project and the potential impacts or impacts related to the resource
- Assess the significance of potential impacts or impacts
- Provide mitigation measures to minimize the potential impacts or effects, as necessary.

Impacts on offshore geologic resources include direct physical disturbance to the seafloor during construction, routine operations, and decommissioning activities. These impacts could result from the following:

- Installation of the STL subsea system, including placement of components on the seafloor and anchoring of construction barges
- Plowing of the seafloor, placement of concrete mattresses, and anchoring of barges during pipeline installation
- Sweeping of the seafloor due to movement of STL mooring lines during routine operations
- Decommissioning activities consisting of the STL subsea system removal from the seafloor and anchoring of construction vessels (Port Dolphin 2007c).

Geological resources generally would not be impacted by the Project. Some localized, short-term changes in sedimentation would be expected. It is not expected that the Project would cause destruction

of any unique geologic feature, increase erosion potential, prevent recovery of mineral resources, increase the potential for geologic hazards (e.g., seismicity), or alter soil composition or structure.

For the purposes of the impacts analysis, and in the absence of data obtained from multiple core samples and similar investigative survey methods along alternative routes, conditions of the hard-bottom seafloor are assumed to be identical for the proposed and alternative routes.

4.4.1 Impacts of the Proposed Action

4.4.1.1 Construction

Port installation would include the installation of two mooring systems, STL buoys, flexible risers, umbilicals, and STL buoy pick-up system. The anchoring system would anchor the mooring buoys to the seafloor using traditional techniques. It is estimated that the installation of the mooring lines and anchors would directly affect 0.22 hectares (0.56 acres) of sediment and 0.012 hectares (0.032 acres) of hard bottom (Port Dolphin 2007c). Impacts on sediments and the seafloor would result from excavation necessary to install the anchoring system and the disturbance of seafloor sediments associated with the installation. There would be short-term, minor, direct, and adverse impacts on seafloor topography from the installation of the Port. The installation of the piles, manifolds, and flowline would cause short-term localized disturbances to the existing seafloor topography as a result of excavation and equipment movement associated with the Port installation.

Plowing is the proposed technique for laying the pipeline, but might not be achievable over the entire length of the pipeline. The offshore pipeline from the piggable-Y to the bulkhead would be approximately 68 km (42 mi) long. Installation would result in seafloor impacts as a result of excavation and equipment movement necessary to install the pipeline. Geohazard surveys along the proposed route indicate 58 percent of the offshore route would be located in soft-bottom seafloor, and could be plowed (Port Dolphin 2007c).

The pipe would be covered where the geologic character of the seafloor is unsuited for burial, such as hard-bottom seafloor. Cover techniques might involve the use of a concrete mattress that would be positioned by a crane and divers or submersible vehicles. Alternatively, rocks could be laid over the pipe to provide a protective cover. Of the total length of the pipeline, approximately 42 percent would be considered either unplowable or marginally plowable and would be covered by concrete mattresses or other external protection. This includes an extensive hard-bottom area at a depth of about 14 to 20 m (45 to 65 feet) where no gap for the pipeline could be located. The width of seafloor that would be affected by mattresses is 4 m (13 feet). Therefore, a total area of 16.54 hectares (40.87 acres) of seafloor would be affected. This would include 9.24 hectares (22.84 acres) of soft bottom and 7.29 hectares (18.03 acres) of hard bottom. The reason that some soft-bottom areas would be covered by mattresses is because the curvature of the route would not allow plowing in some areas (Port Dolphin 2007c).

In addition to the seafloor directly disturbed by plowing and placement of concrete mattresses, the seafloor would be disturbed by anchoring of the pipelaying barge. It has been assumed that all pipelaying and burial activities would be performed from large anchored barges with high-capacity anchoring systems. The mattress placement operations would be performed using a flat deck support crane barge with a 4-point mooring system using Workboat-style anchors. During pipeline installation, barge anchor cables would be expected to sweep the seafloor causing disturbance of the underlying sediments and terrain. Short-term, minor, direct, adverse impacts on seafloor sediments and topography would be expected as a result of anchor sweep. Impacts on sediments associated with anchor sweep would be expected to be short-term because over time seafloor currents would be expected to reestablish pre-disturbance sediment and terrain characteristics.

Short-term, minor, direct, adverse impacts on sediments and topography would be expected during Port and pipeline installation.

Impacts on natural geologic resources in onshore areas would be expected where HDD is used to install the pipeline, as a result of disturbance to natural geologic features. Impacts on soils would be expected as a result of disturbance associated with excavation and fill necessary to install the onshore pipeline, Port Manatee valve station, and Gulfstream and TECO Interconnection Station, and potential erosion and sedimentation associated with the pipeline installation.

To avoid coastal mangroves, nearshore pipeline installation would be accomplished by implementing HDD techniques. The technique would be implemented to install the pipeline under the mangroves. Long-term, minor, direct impacts on natural geological resources would be expected to occur as a result of drilling to accommodate pipeline installation in this area. The remainder of the pipeline would be installed by using an open cut trench method. Approximately 20 hectares (45 acres) of soils would be temporarily impacted during the construction within the 30-m- (100-foot-) wide pipeline ROW.

There is no set ROW in Federal or state waters, and FDEP has stated that no buffer would be imposed in potential sand resource areas (Dow 2009). Port Dolphin LLC has stated that a buffer that would extend 61 m (200 feet) on either side of the installed pipeline or a total width of 122 m (400 feet) would be sufficient to protect the pipeline. Therefore, it is assumed that recovery of sand for beach renourishment would be prohibited within the 122-m (400-foot) buffer. As described in **Section 3.4**, there is only one permitted and active sand borrow area in the vicinity of the Project, but other potential areas have been identified along the proposed pipeline route. **Figure 3.4-5** shows the identified potential sand borrow areas in the Project vicinity. The areas other than Borrow Area IX have been identified as potential resources, but not investigated or permitted. Therefore, no restrictions exist that would preclude other uses, such as pipeline installation and operation. From the figure, it is clear that there are several potential sand resource sites between the proposed pipeline route and the nearby beach areas to the south. These potential areas have not been evaluated for their suitability for beach renourishment, but represent total potential sand resources.

In comments on the Draft EIS dated May 29, 2008, the Town of Longboat Key identified Borrow Area IX and the High Volume Sand Shoal as the "current and long-term, white, beach-compatible sand source for its beach-management plan." The town requested that these areas be avoided, and proposed four alternative routes to avoid the identified areas. The Applicant submitted a revised pipeline route in December 2008 (Addendum II) that closely followed one of the routes proposed by Longboat Key. A second alternative, the Offshore Interconnection Pipeline Route Alternative, is discussed in **Section 4.1.6**. A third alternative, approaching the Gulfstream Pipeline through an area identified by Longboat Key as having few potential sand resources and then paralleling the Gulfstream Pipeline into Tampa Bay was evaluated and not carried forward for detailed evaluation. The screening evaluation is discussed in **Section 2.1.4.6**.

As noted in **Section 3.4.3**, four potential sand resource areas have been evaluated; Borrow Area IX, the High Volume Sand Shoal, the Longboat Key-identified potential sand resources, and the ROSS potential sand resource area. **Table 4.4-1** tabulates the areas of each potential sand resource area, the total potential volume of recoverable sand, length of the pipeline route that passes through the area, the volume of potential sand resources impacted by the Proposed Pipeline Route, and the percentage of total potential resource volume impacted by the Proposed Pipeline Route. Calculations for each potential sand resource area group have been made based on the area of the group and the length of the pipeline that would pass through the area. For example, all of the areas identified by Longboat Key were added together, and the potential volume of sand was calculated based on the low sand depth assumption and for the high sand depth assumption. This total volume was compared to the volume that would be obstructed by the

Proposed Route, which passes through three areas identified by Longboat Key. The Proposed Pipeline Route completely avoids Borrow Area IX and the High Volume Sand Shoal Area. The Proposed Pipeline Route passes through potential areas identified by Longboat Key, including the area identified in Federal waters as F-2, in their May 28, 2008, comments for a distance of 3.9 km (2.4 mi), and through the ROSS area for a distance of approximately 25.3 km (15.7 mi). These lengths were used to calculate the volumes in **Table 4.4-1.**

Table 4.4-1. Impacts on Potential Sand Borrow Areas

	Size of Area (acres)	Volume of Area (cubic yards)		Length of pipeline through impacted area (feet)	Volume of Impacted Area (cubic yards)		Percentage of potential volume impacted
		3.75-foot average depth	9.5-foot average depth		3.75-foot average depth	9.5-foot average depth	
Borrow Area IX	264	14,374,800	36,416,160	0	0	0	0.00%
High Volume Sand Shoal	4,500	245,025,000	620,729,999	0	0	0	0.00%
Longboat Key Potential Areas	128,000	6,969,599,993	17,656,319,982	12,858	6,428,904	16,286,556	0.09%
ROSS Area	538,000	29,294,099,971	74,211,719,926	38,187	19,093,486	48,370,164	0.07%

In 2006, Longboat Key used approximately 1,360,000 m^3 (1,790,000 y^3) of sand resources for their beach renourishment project. Assuming Longboat Key's next major beach renourishment project requires a similar amount of sand the proposed pipeline route would result in a loss of beach quality sand from the Longboat Key-identified potential sand resource areas equivalent to 2 to 5.5 beach renourishment projects. The loss of sand resulting from the proposed pipeline obstruction on ROSS-identified resources would result in the loss of 10.6 to 27.0 beach renourishment projects. No loss of beach quality sand within Borrow Area IX or the High Volume Sand Shoal is anticipated to occur.

In comments submitted on the docket dated May 28, 2009, on behalf of the Town of Longboat Key, additional potential sand resource areas were identified in Federal waters based on geotechnical data collected by the Applicant in their surveys of the Proposed Pipeline Route. These areas are several miles farther away from the beach areas on Longboat Key than many of the areas identified earlier. The proposed pipeline route passes through one of these areas (F-2). In both the comments submitted in 2008 and 2009, Longboat Key stressed the importance of having beach renourishment sources close to the beaches. They noted the significant additional costs of hauling sand resources long distances. As noted previously, Longboat Key has identified Borrow Area IX and the High Volume Sand Shoal as their long-term source of sand. Therefore, since the area identified in the 2009 comments is small (approximately 587 acres) and more than 12 miles from Longboat Key in Federal waters, there appear to be several potential areas, in addition to Borrow Area IX and the High Volume Sand Shoal, that could contain suitable sand that are closer to the beaches on Longboat Key than the newly identified areas.

Based on analysis of the available information and conservative assumptions on the volume of recoverable sand in potential resource areas, the impacts from the pipeline route passing through the three areas identified by Longboat Key and the northern portion of the ROSS area are long-term, minor, direct, and adverse. It would not be expected that the volumes of sand excluded from consideration for beach renourishment would have any substantial impact on the beach renourishment projects, and, therefore, there would be no short-term or long-term related impacts, such as excessive beach erosion, loss of tourist interest in the area, or degradation of roadways and transportation. Impacts on previously undisturbed soils would be expected to be long-term, minor, direct, and adverse because the pipeline alignment and locations for the Port Manatee valve station and Gulfstream Interconnection Station occur in areas previously disturbed by pipeline placement, agriculture, and urbanization.

Short- and long-term, minor, direct, and adverse impacts on geology and soils would be expected as a result of constructing the onshore pipeline, Port Manatee valve station, and Gulfstream and TECO Interconnection Station. No adverse impacts on Prime Farmland would be expected because there are no prime farmland soils mapped in Manatee County so there is no Prime Farmland in the county.

In response to Federal, state, and local requirements, BMPs have been included in project design or proposed by the Applicant to reduce environmental impacts, and are discussed in **Section 4.11**.

4.4.1.2 Operations

Anchor chains and cables from the buoy and flexible risers would chafe bottom sediments between each anchor in the anchoring system. The estimated affected area from the anchor chains/cables at both buoys would be approximately 8.9 hectares (22 acres) (5.2 hectares [12.95 acres] of soft bottom and 3.7 hectares [9.15 acres] of hard bottom) (Port Dolphin 2007c). The seafloor around the north and south buoy locations includes both soft-bottom and hard-bottom areas. The anchor layouts have been planned to minimize the amount of hard-bottom habitat contacted. Impacts on hard-bottom and sediments from the chaffing of the anchor chains/cables and flexible riser would last for the duration of the Project, but would be expected to return to preconstruction conditions over time after the decommissioning.

Long-term, minor, direct, adverse impacts on sediments would be expected from Port Dolphin operations.

Placement of concrete mats on the seafloor could result in localized modification of currents and depositional characteristics resulting in minor modification of seafloor topography adjacent to the pipeline over time.

Long-term, minor, direct, adverse impacts on seafloor topography would be expected to occur in areas where concrete mats are used to cover the offshore pipeline.

Impacts on potential sand resources would occur for the duration of Port Dolphin operations and would result from restricted use and recovery of sand resources for beach renourishment projects. The volumes of sand impacted by the operation of the pipeline and the buffer around it would be the same as discussed in **Section 4.1.1.1**, Construction Impacts. For the reasons discussed in **Section 4.1.1.1**, the impacts from the operation of the Proposed Pipeline would be long-term, minor, direct, and adverse.

No adverse impacts on geology or soil resources would be expected as a result of operating the onshore pipeline, Port Manatee valve station, and Gulfstream Interconnection Station because no new land disturbance would be expected.

In response to Federal, state, and local requirements, BMPs have been included in project design or proposed by the Applicant to reduce environmental impacts, are discussed in **Section 4.11**.

4.4.1.3 Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Short-term, minor, direct, adverse impacts would be expected on seafloor topography and sediments during the decommissioning of the Project.

There would be no plowing of the seafloor and no anchoring along the pipeline route during decommissioning. Seafloor impacts during decommissioning are expected to be similar to those from installation of the STL subsea system. The impacts would be concentrated around the north and south buoy locations.

Terrestrial decommissioning of the Project would consist of the removal of all aboveground pipeline-related equipment and facilities. Decommissioning of the pipeline would consist of the removal of any hydrocarbons in the pipe through flushing, filling the pipe with treated freshwater, and capping the ends of the pipe.

Minor, adverse impacts on soils would be expected during the demolition of aboveground facilities as a result of ground disturbance associated with equipment and structure removal. No adverse impacts on geology or soils would be expected as a result of decommissioning of the buried pipeline.

Potential impacts on geologic and soils resources would be reassessed prior to decommissioning based upon environmental conditions and laws at that time.

4.4.2 Alternatives

Table 4.4-3 compares impacts from the Proposed Action to each of the alternatives with respect to geological resources.

4.4.2.1 Southern Site and Route Alternative

Based on information provided by the Applicant's geophysical surveys, the Southern Port Site and Route Alternative geological conditions would be similar to the Proposed Route for the offshore portions until the southern Route approaches the entrance to Tampa Bay. Since the southern route would pass through the area between Anna Maria Island and Passage Key, the pipeline would run through the High Volume Sand Shoal and Borrow Area IX, and adjacent to and within the boundaries of the Terra Ceia AP. As

proposed, the Southern Route Alternative enters the Terra Ceia AP from the northwest and traverses primarily soft-bottom and some hard-bottom areas for 4.8 km (3 mi). The pipeline exits the preserve, and traverses another 5.8 km (4 mi) along the northern boundary before re-entering the preserve at the northeastern corner for 1.1 km (0.7 mi). Less than 10 percent of the Southern Route Alternative overlaps with the Proposed Route in Tampa Bay as it approaches the landfall area at Port Manatee. For the offshore areas, the seafloor conditions are similar. Therefore the impacts related to the Southern Site and Route Alternative would be slightly higher because of the greater length. The offshore portion of the Southern Route Alternative is 74 km (46 mi), or about 6.4 km (4 mi) longer than the proposed route. Because impacts related to gas transmission line installation account for most of the total, the overall impact area for the Southern Site and Route Alternative would be greater for the gas transmission line installation (Port Dolphin 2007c).

Short-term and long-term, minor, direct, adverse impacts on seafloor sediments and topography would be expected during Port and gas transmission line installation, operation, and decommissioning. Impacts associated with Port installation, operation, and decommissioning would be expected to be the same or similar to those discussed for the proposed location and route.

Impacts on sand resources from implementation of the Project along the Southern Route Alternative would be larger in both area and volume of potential sand resources, and would directly impact Borrow Area IX. The southern pipeline route would cross four partially overlapping potential sand sources, including Longboat Key, ROSS, High Volume Sand Shoal, and Borrow Area IX.

Impacts on sand resources have been calculated using the same assumptions used in calculating the impacts for the Proposed Route. A buffer zone of 122 m (400 feet) centered on the pipeline and average sand depths of 1.1 m (3.75 feet) and 2.9 m (9.5 feet) were used to calculate volumes. The impacts on sand resources are detailed in **Table 4.4-2**.

Table 4.4-2. Impacts on Potential Sand Borrow Areas along the Southern Site and Route Alternative

	Size of Area (acres)	Volume of Area (cubic yards)		Length of pipeline through impacted area (feet)	Volume of Impacted Area (cubic yards)		Percentage of potential volume impacted
		3.75-foot average depth	9.5-foot average depth		3.75-foot average depth	9.5-foot average depth	
Borrow Area IX	264	14,374,800	36,416,160	1,766	883,115	2,237,225	6.14%
High Volume Sand Shoal	4,500	245,025,000	620,729,999	12,302	6,151,033	15,582,617	2.51%
Longboat Key Potential Areas	125,000	6,806,249,993	17,242,499,983	24,046	12,022,998	30,458,260	0.18%
ROSS Area	538,000	29,294,099,971	74,211,719,926	50,227	25,113,744	63,621,485	0.09%

In 2006, Longboat Key used approximately 1,360,000 m^3 (1,790,000 y^3) of sand resources for their beach renourishment project. Assuming Longboat Key's next major beach renourishment project requires a similar amount of sand the southern pipeline route would result in a loss of beach quality sand from Borrow Area IX equivalent to 0.5 to 1.2 renourishment projects. The loss of beach quality sand resulting from the proposed pipeline obstruction on ROSS-identified resources would result in sand loss equivalent to 14.0 to 35.5 beach renourishment projects.

Potential impacts on geologic and soils resources would be reassessed prior to decommissioning based upon environmental conditions and laws at that time.

4.4.2.2 Offshore Interconnection with the Gulfstream Pipeline Alternative

Detailed information about seafloor conditions is only available for the proposed pipeline route. However, considering the known geologic conditions of the west Florida shelf, it is a reasonable assumption that seafloor conditions in the alternative routes are similar to the proposed route (Port Dolphin 2007c). Impacts associated with the offshore interconnection alternative would be expected to be similar to those associated with the offshore component of the proposed alternative. However, the length of area impacted in association with gas transmission line placement under the offshore interconnection alternative is approximately 28.8 km (18 mi) and under the proposed alignment it is 67.6 km (42 mi). No adverse impacts on seafloor geology or terrestrial geology and soils would be expected shoreward of the offshore interconnection because the gas transmission line is the existing Gulfstream Pipeline. Impacts associated with Port and offshore gas transmission line installation, operation, and decommissioning would be expected to be the same or similar to those discussed for the proposed location and route.

Short-term and long-term, minor, direct, adverse impacts on seafloor sediments and topography would be expected during Port and gas transmission line installation, operation, and decommissioning. No adverse impacts would be expected along the nearshore or terrestrial components of pipeline because the gas transmission line ties into and utilizes existing Gulfstream Pipeline shoreward of the offshore interconnection.

Potential impacts on geologic and soils resources would be reassessed prior to decommissioning based upon environmental conditions and laws at that time.

4.4.2.3 FSRU Port Design Alternative

Under the FSRU alternative, the FSRU and gas transmission line would be in the same locations as the Port and transmission lines under the proposed alternative. Construction, operation, and decommissioning impacts and mitigations would be expected to be the same under both alternatives.

Short-term and long-term, minor, direct, adverse impacts on sediments and topography would be expected during FSRU and gas transmission line installation, operation, and decommissioning.

Potential impacts on geologic and soils resources would be reassessed prior to decommissioning based upon environmental conditions and laws at that time.

4.4.2.4 AAV Vaporization Technology Alternative

Construction, operation, and decommissioning impacts under the AAV Vaporization Technology Alternative would be similar to those under the Proposed Action.

4.4.2.5 Suction Piles Anchoring Alternative

Construction, operation, and decommissioning impacts under the Suction Piles Anchoring Alternative would be similar to those under the Proposed Action.

4.4.2.6 No Action Alternative

The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the License, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, the Port Dolphin pipeline would not be constructed, so no adverse impacts on seafloor hard bottom, sediments, or topography resulting from Port and gas transmission line installation, operation, or decommissioning would occur. No adverse impacts on offshore or terrestrial geologic or soil resources would be expected under the No Action Alternative. Means to satisfy the Nation's energy demands might result in increased use of existing land-based terminals, greater reliance on declining domestic oil and gas resources, or development of alternate means of importing LNG. Alternative sources of natural gas can include other Deepwater LNG Ports or onshore LNG terminals. Other Deepwater LNG Ports might have similar impacts on geologic resources, but in a different geographic location. Onshore LNG terminals would be located in coastal areas where there would be greater likelihood of impacting geologic resources in the nearshore and coastal areas.

Table 4.4-3. Summary of Impacts on Geology

Impacts	Proposed Action	Southern Site and Route Alternative	Offshore Interconnection Alternative	FSRU Design Alternative
Construction				
Port anchoring system impacts on seafloor sediments and topography.	Short-term, minor, direct, and adverse.	Short-term, minor, direct, and adverse. Type and level of impacts expected to be similar to the Proposed Action.	Short-term, minor, direct, and adverse. Type and level of impacts expected to be similar to the Proposed Action.	Short-term, minor, direct, and adverse. Type of impacts expected to be similar to Proposed Action, but to a lesser degree because there would be only one mooring system.
Pipeline installation impacts on seafloor sediments and topography.	Short-term, minor, direct, and adverse.	Short-term, minor, direct, and adverse. Type of impacts expected to be similar to the Proposed Action, but to a greater degree because the gas transmission line would extend for 74 km (46 mi) offshore. Under Proposed Action the gas transmission line would extend for 67.6 km (42 mi) offshore.	Short-term, minor, direct, and adverse. Type of impacts expected to be similar to the Proposed Action, but to a lesser degree because the new gas transmission line would extend for 28.8 km (18 mi) offshore. Under the Proposed Action the gas transmission line would extend for 67.6 km (42 mi) offshore.	Short-term, minor, direct, and adverse. Type of impacts expected to be similar to the Proposed Action. The offshore gas transmission line would extend for 67.6 km (42 mi) offshore along the same alignments under both alternatives.
Anchor sweep impacts on seafloor sediments and topography.	Short-term, minor, direct, adverse.	Short-term, minor, direct, and adverse. Type of impacts expected to be similar to the Proposed Action, but to a greater degree because the gas transmission line would extend for 74 km (46 mi) offshore. Under the Proposed Action the gas transmission line would extend for 67.6 km (42 mi) offshore.	Short-term, minor, direct, and adverse. Type of impacts expected to be similar to the proposed action, but to a lesser degree because the new gas transmission line would extend for 28.8 km (18 mi) offshore. Under the Proposed Action the gas transmission line would extend for 67.6-km (42-mi) offshore.	Short-term, minor, direct, and adverse. Type of impacts expected to be similar to the Proposed Action. The offshore gas transmission line would extend for 67.6 km (42 mi) offshore along the same alignments under both alternatives.
HDD drilling impacts on geology.	Long-term, minor, direct, and adverse.	Long-term, minor, direct and adverse. Type and level of impacts expected to be similar to the Proposed Action.	No adverse impacts are expected.	Long-term, minor, direct and adverse. Type and level of impacts expected to be similar to the Proposed Action.

Impacts	Proposed Action	Southern Site and Route Alternative	Offshore Interconnection Alternative	FSRU Design Alternative
Construction (continued)				
Pipeline installation impacts on previously undisturbed soils.	Long-term, minor, direct, and adverse.	Long-term, minor, direct and adverse. Type and level of impacts expected to be similar to the Proposed Action.	No adverse impacts are expected.	Long-term, minor, direct and adverse. Type and level of impacts expected to be similar to the Proposed Action.
Pipeline installation erosion and sedimentation impacts on soils.	Short-term, minor, direct, and adverse impacts.	Long-term, minor, direct and adverse. Type and level of impacts expected to be similar to the Proposed Action.	No adverse impacts are expected.	Long-term, minor, direct and adverse. Type and level of impacts expected to be similar to the Proposed Action.
Pipeline installation impacts on prime farmland soils and Prime Farmland.	No adverse impacts are expected.	No adverse impacts are expected.	No adverse impacts are expected.	No adverse impacts are expected.
Operation				
Bottom chafing from anchor chains and cables associated with buoys and flexible risers.	Long-term, minor, direct, and adverse.	Long-term, minor, direct and adverse. Type and level of impacts expected to be similar to the Proposed Action.	Long-term, minor, direct and adverse. Type and level of impacts expected to be similar to the Proposed Action.	Long-term, minor, direct and adverse. Type and level of impacts expected to be similar but less than the Proposed Action.
Modification of seafloor topography adjacent to the pipeline due to changes in current and depositional characteristics associated with concrete mats.	Long-term, minor, direct, and adverse.	Long-term, minor, direct, and adverse. Type and level of impacts expected to be similar to the Proposed Action.	Long-term, minor, direct, and adverse. Type of impacts expected to be similar to the Proposed Action, but to a lesser degree because the new gas transmission line would extend for 28.8 km (18 mi) offshore. Under the Proposed Action the gas transmission line would extend for 67.6 km (42 mi) offshore.	Long-term, minor, direct and adverse. Type and level of impacts expected to be similar to the Proposed Action.

Impacts	Proposed Action	Southern Site and Route Alternative	Offshore Interconnection Alternative	FSRU Design Alternative
Operation (continued)				
Loss of future potential sand resources along and adjacent to the pipeline alignment.	Long-term, minor, direct, and adverse.	Long-term, minor direct, and adverse. Type of impacts expected to be similar to the Proposed Action. The level of impact would increase to a minor degree because the proposed pipeline was realigned to avoid potential impacts to known sand resources.	No adverse impacts are expected.	No adverse impacts are expected.
Decommissioning				
Impacts on seafloor sediments and topography due to seafloor disturbance associated with buoy, riser, umbilical, mooring lines, and pile anchor removal.	Short-term, minor, direct, and adverse.	Short-term, minor, direct, and adverse. Type and level of impacts expected to be similar to the Proposed Action.	Short-term, minor, direct, and adverse. Type and level of impacts expected to be similar to the Proposed Action.	Short-term, minor, direct, and adverse. Type and level of impacts expected to be similar to the Proposed Action.
Impacts on soils from ground disturbance associated with removal and demolition of equipment and structures.	Negligible adverse effects.	Negligible adverse effects. Type and level of impacts expected to be similar to the Proposed Action.	No adverse impacts are expected.	Negligible adverse effects. Type and level of impacts expected to be similar to the Proposed Action.

Notes:

There would be no impacts from the No Action Alternative.

The AAV Vaporization and Suction Pile Anchoring Alternatives were carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.5 Marine Areas and Land Use

4.5.1 Impacts of the Proposed Action

4.5.1.1 Construction

This section discusses impacts on those resource areas defined by their human use and value. As discussed in **Section 3.5**, the Port facility and pipeline would, for the life of the Project and even after, impact future uses in the areas of impact. As discussed in **Section 2.3**, the Port facilities footprint would include the buoys and the pipeline. The port footprint would be 22 acres. Direct impacts on the port footprint would include constant disturbance from anchors (0.088 acres from mooring anchors) and mooring line sweep. Indirect impacts on the 22 acres would include use restriction for recreation and commercial marine activities within the entire 22 acres. **Figure 2.1-7** shows the conceptual footprint of the Port.

The following discussion of marine areas and land use impacts includes an analysis of impacts and a determination of impact duration and severity. Included in the discussion are elements of the project description that would both produce impacts and are proposed to minimize potential impacts. Applicant-proposed measures for minimizing potential environmental impacts are those that have been committed to by the Applicant and incorporated into the project design, and are listed in **Section 4.** If further measures are recommended by agencies to mitigate potential adverse impacts, they are stated at the end of each analysis and in **Section 4.11**. For analyses where no mitigation measures are stated, none have been identified to further reduce potential adverse impacts.

The Applicant conducted geophysical surveys along the offshore pipeline corridor 914 m (3,000 feet) wide for the length of the offshore pipeline, which is approximately 67 km (42 mi). Not all of the 3,000-foot corridor would be directly impacted by the pipe; however, finite areas along the surveyed area would be directly impacted by anchor placement for construction equipment. The geophysical survey was used to develop an anchor handling plan to avoid sensitive areas such as cultural resources. The Applicant has estimated that each anchor would impact 33.4 square meters (m^2) (360 square feet [ft^2]) of submerged land. Anchors would be required during pipelaying, plowing, backfilling, and mattress placement activities resulting in a total of 2,480 separate anchor placements along the pipeline construction corridor. Anchor placement would result in approximately 27.5 acres of impacts in finite areas along the surveyed corridor, and an additional 8,992 acres of impacts to the seafloor from anchor sweep (Port Dolphin 2008d).

Subsequent to the original geophysical surveys, the Applicant conducted site-specific geotechnical surveys in order to develop the construction plan for the pipeline. The construction footprint for the offshore pipeline corridor has been revised based on additional geotechnical surveys. For the offshore pipeline, the construction corridor has been revised from the original 914 m (3,000 feet) corridor to 20.4 m (67 feet). The construction corridor would be reduced even further to 6.1 m (20 feet) in areas where concrete mattresses were used to protect the pipeline instead of burial. The offshore construction footprint for the pipeline has been calculated to be approximately 331 acres (Port Dolphin 2008d). The Applicant plans to use mattresses in hard-bottom areas, in transition areas where HDD construction techniques would be employed, and along the corridor under the Sunshine Skyway Bridge (due to ruble from bridge restoration projects). **Figure 2.3-9** shows the typical construction corridor for the offshore pipeline construction. During construction, USCG would require a Clearance Zone around equipment for safety purposes. All ships and recreational vessels would be required to navigate around the Clearance Zone during construction.

The construction corridor for the onshore portion of the pipeline would be limited to 30 m (100 feet) wide for the length of the onshore pipeline, which is approximately 6.6 km (4.1 mi). It is expected that the entire construction corridor would be impacted during construction. One side of the construction corridor would be used for travel by construction equipment, and the other side would be used for spoil. **Figure 2.3-9** shows the typical construction corridor for the onshore pipeline construction. The total onshore construction footprint for the onshore portion of the pipeline has been calculated to be approximately 45 acres.

Table 4.5-1 shows the marine areas and land use traversed by the proposed pipeline. The offshore pipeline would be constructed through both hard and soft bottom areas. Hard-bottom areas include live benthic habitat and areas where rock outcroppings are on or near the surface of the seafloor. Soft-bottom areas include sand resource areas, and state disposal areas for materials taken from vessel transportation fairways. All disposal areas are within the state waters of Florida in Manatee County. The onshore pipeline would traverse both agricultural and urban areas, water and wetlands. The following paragraphs discuss in detail marine areas and land uses traversed by the Project and specific impacts.

Table 4.5-1. Marine Areas and Land Use Areas Traversed by the Proposed Route Alternative

Location	Marine Area or Land Use Type	Crossing Length in miles (mi)	Construction Area in Acres (67-foot corridor offshore, and 100-foot corridor onshore)
Offshore	Hard-bottom areas	15 mi	3,388 acres
	Sandy-bottom areas (including sand resource areas and spoil areas)	27 mi	5,894 acres
	Identified sand source areas (LBK and ROSS)	(8.6 mi)	(70 acres)
	Tampa/Hillsborough Bay Channel spoil areas	(4 mi)	(32 acres)
	Nearshore fish havens	0	0
	National preserves and wildlife refuges	0	0
	Total Offshore	***42mi***	***9,272 acres***
Onshore	Urban and built-up (100)	0.6 mi	5.3 acres
	Agriculture (200)	0.7 mi	8.2 acres
	Upland Forest (400)	0.6 mi	7.5 acres
	Water (500)	0.7 mi	2.5 acres
	Wetlands (600)	0.9 mi	10.7 acres
	Transportation, communications, and utilities (800)	1.1 mi	10.5 acres
	Total Onshore	***4.1mi***	***45 acres***

Source: Port Dolphin 2007b,d

Note: Length and areas are rounded to nearest whole number for planning purposes

Shipping Fairways, Waterways, and Channels. The proposed Port would be installed outside shipping fairways and navigation channels, and would have no direct impacts on shipping lanes or channels from

increased traffic and potential collisions with support vessels during construction. There would be short-term, minor, adverse, indirect impacts on shipping lanes or channels from increased traffic and potential vessel collisions with pipeline barge and support vessels associated with pipeline installation. Short-term, minor, direct, adverse impacts would occur because the pipeline placement would cross no shipping fairways.

Recreational Fisheries. Direct and indirect adverse impacts on recreational fisheries from the proposed Port installation would be similar to impacts on commercial fisheries (discussed in **Section 4.9**), and would include temporary exclusion during the proposed Port and pipelines construction, displacement of fish due to noise disturbance in the work area, and an increase in sediment loads during installation. The impacts would be temporary and minor. Minor, indirect, beneficial impacts would occur from induced conservation associated with the Safety Zone. The Safety Zone would extend approximately 850 m (2,789 feet) from the center of each buoy and encompass approximately 561 acres.

Sand Resources. Beach communities in Manatee and surrounding counties rely on sand resources from the submerged lands within Florida state waters to renourish the local beaches along the waterfront. The proposed offshore pipeline would cross identified potential sand resource areas identified by both the ROSS database and the Longboat Key community. The pipeline would cross approximately 13.9 km (8.6 mi) of identified sand area.

Benthic Habitats. The Applicant conducted extensive geotechnical and geophysical surveys along the proposed pipeline route to identify and quantify benthic habitat. Surveys concluded that both hard-bottom and live-bottom habitats as well as soft-bottom/sand habitats existed along the corridor.

Onshore Impacts. Construction on the onshore portion of the Project is expected to take 100 days to install the HDDs and bores; ditch, string, and weld the pipeline components; construct the aboveground facilities; and test and commission the pipeline. No residential area would be traversed by the onshore portion of the pipeline. To minimize impacts during construction, Port Dolphin would follow the FERC Plan and Procedures.

An interconnection site would be constructed at the terminus of the Port Dolphin pipeline to connect with the existing Gulfstream pipeline and the Proposed TECO Bayside pipeline. The Proposed interconnection site would be located on a place zoned for industrial use adjacent to the existing Gulfstream pipeline facility. Following construction of the pipeline and aboveground facilities, the Applicant would restore the construction ROW following the FERC Procedures (see **Section 2.3.9**). Except for ROWs permanently converted to natural gas use (e.g., aboveground facilities), preconstruction land use that would not interfere with the safe operation of the pipeline would be allowed to resume.

Construction impacts on marine areas and land uses would be minor to moderate, short-term, direct, and adverse. The Maritime Administration and USCG have recommended the Applicant repair any damage to roadways caused by construction. This would effectively mitigate all construction damage potentially caused by construction activities. The FERC and the Applicant have also developed BMPs to avoid and reduce impacts on resources. BMPs are industry standards developed through lessons learned. BMPs can become regulations or agency permit requirements which are required to effectively reduce impacts on natural resources. Mitigations and BMPs are outlined in **Section 4.11**.

4.5.1.2 Operations

Under the DWPA implementing regulations, the USCG is authorized to establish a permanent mandatory Safety Zone around deepwater ports whether a vessel is present or not. The USCG and Maritime Administration may establish ATBA/NAA zones around Port Dolphin during the operation of the

deepwater port to ensure the safe operation of the Port, as well as other users in the adjacent waters of the Port. These safety restrictions might directly or indirectly impact non-Project vessels.

- **Safety Zone.** Commercial and recreational fishing would be precluded from the Safety Zone for the life of the Project. Under the DWPA implementing regulations, the USCG is authorized to establish a permanent mandatory Safety Zone around deepwater ports whether a vessel is present or not. The Safety Zone would extend approximately 850 m (2,789 feet) from the center of each buoy and encompass approximately 561 acres. This is a result of maintaining 500 m (1,641 feet) from the moored LNGC (maximum of approximately 350 m [1,148 feet] length) as it weathervanes (rotates) around the buoy. All unauthorized vessels would be prohibited from anchoring or transiting the proposed Safety Zone at any time. The USCG would have the primary jurisdiction for the Safety Zone.
- **No Anchoring Area.** If a License is issued, the USCG may designate a mandatory NAA around the Port and the pipeline. The NAA restrictions would extend beyond the buoy anchors with an approximately 1,000-m (3,280-foot) radius around each of the buoys.
- **Area to be Avoided.** The ATBA would be established at the request of USCG to the IMO. The ATBA would extend with an approximately 1,200-m (3,937-foot) radius around each of the buoys, and would include the area between the buoys. This would help ensure that other vessels do not interfere with Port operations, including maneuvering of LNG and support vessels.

In general, the Safety Zone, NAA, and ATBA would be established at all times. SRV traffic would be coordinated by Port personnel. The actual size of the ATBA that would be requested of IMO would be determined through the advice and consent of USCG and would appear on subsequent editions of the nautical charts. The ATBA is meant to discourage vessel traffic and is normally recommendatory. The Safety Zone, NAA, and ATBA are shown in **Figure 2.3-11.**

Operation of the adjacent submerged and onshore land adjacent to the pipeline would be consistent with current MMS leasing and operation activities in Federal waters, with FDEP in State waters, and with the FERC guidelines for onshore pipeline operation and maintenance activities. MMS and FDEP do not have standard widths for permanent ROW in Federal and state waters. For pipelines located in submerged lands, MMS and FDEP both require that the owner of the pipeline manage the safe operation through protection practices and pipeline testing activities. Port Dolphin LLC has stated that a 400-foot buffer would be necessary where sand is harvested for beach renourishment projects in order to maintain the integrity of the pipeline.

4.5.1.3 Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to

decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

4.5.2 Alternatives

As discussed in **Section 2.1**, the Maritime Administration and USCG considered several alternatives to the Proposed Action that also meet the purpose and need. This section compares the alternatives to the Proposed Action to broaden the scope of options that might be available to reduce or avoid impacts associated with the Proposed Action with respect to marine areas and land use. **Table 4.5-2** compares impacts from the Proposed Action to each of the alternatives with respect to land resources.

Table 4.5-2. Marine Areas and Land Use Impact Comparison for Each Alternative

Impact	Proposed Action	Southern Site and Route Alternative	Offshore Interconnection with Gulfstream Pipeline Alternative	FSRU Port Design Alternative
Hard-bottom area*	3,026 acres	3,934 acres	1,816 acres	0.016 acres (at port only)
Offshore spoil areas	32 acres	32 acres	0 acres	NA
Sand resource areas	68 acres	103 acres	0 acres	NA
Urban and built-up (100)	5.28 acres	5.28 acres	0 acres	NA
Agriculture (200)	8.22 acres	8.22 acres	0 acres	NA
Upland forest (400)	7.5 acres	7.5 acres	0 acres	NA
Water (500)	2.51 acres	2.51 acres	0 acres	NA
Wetlands (600)	10.7 acres	10.7 acres	0 acres	NA
Transportation, communications, and utilities (800)	10.46 acres	10.46 acres	0 acres	NA

Notes:

NA = No difference between alternatives.

There would be no impacts from the No Action Alternative.

The AAV Vaporization and Suction Pile Anchoring Alternatives were carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.5.2.1 Southern Site and Route Alternative

Impacts on marine areas and land use are expected to be similar in nature to those of the Proposed Site and Route Alternative. However, the buoy anchor plan for this alternative has a footprint of 30 acres, and the offshore pipeline route would be 73.9 km (46 mi). Assuming the maximum construction corridor of 20 m (67 feet), the construction footprint would be 374 acres for the pipeline. The total construction footprint for this alternative is estimated to be 9,323 acres, or 9 percent less than the proposed alternative. For impacts on sand resource areas, assuming a 400-m (1,312-foot) buffer centered on the pipeline, a total of 103 acres of the available area would be restricted for use in beach renourishment. Although still a small percentage of the total sand resources, this impact would be greater than the impact for the proposed route.

4.5.2.2 Offshore Interconnection with the Gulfstream Pipeline Alternative

Impacts on marine areas and land use are expected to be similar in nature to those of the Proposed Site and Route Alternative. However, the offshore pipeline route would be 28.8 km (18 mi), resulting in a total construction footprint of 249 acres. There would be no impacts associated with sand resources, and onshore land use with this alternative. The overall construction footprint for the offshore interconnection pipeline alternative is 60 percent less than the area consumed by the Proposed Action.

4.5.2.3 FSRU Port Design Alternative

Overall footprint of the FSRU would result in approximately 11 acres of impacts on marine areas. This would include both the finite impacts from eight anchor piles, and the area in between those anchors. This impact would be approximately 50 percent less than the area necessary for the Proposed Action.

4.5.2.4 AAV Vaporization Technology Alternative

Construction, operation, and decommissioning impacts under the AAV Vaporization Technology Alternative would be similar to those under the Proposed Action.

4.5.2.5 Suction Piles Anchoring Alternative

Construction, operation, and decommissioning impacts under the Suction Piles Anchoring Alternative would be similar to those under the Proposed Action.

4.5.2.6 No Action Alternative

The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, no adverse impacts from pipeline installation on Florida coastal areas would be expected. Consistency with state coastal management programs in Florida would not be necessary for pipeline construction through coastal waters. There would be no minor, short-term impacts as a result of construction through those areas. No impacts on land use onshore would be expected. No impacts on residences would occur from construction of onshore pipelines. Land cover changes to forested wetlands would naturally occur. There would be no land use restrictions for property owners because of the Proposed Action.

Means to satisfy the Nation's energy demands might result in increased use of existing land-based terminals, greater reliance on declining domestic oil and gas resources, or development of alternate means of importing LNG. Alternative sources of natural gas can include other Deepwater LNG Ports or onshore LNG terminals. Other deepwater LNG ports would have impacts on land uses that are similar to Port Dolphin but in a different geographic location. Onshore LNG terminals would be constructed on the already limited coastal landscape, restricting use of those areas for other uses such as residential, or retail commercial. Due to limited industrial areas along the coast for LNG siting, several LNG facilities might be in close proximity increasing the risk of explosion that might affect the local community. As energy demands grow, onshore LNG facilities may need to expand industrial areas, restricting use of adjacent lands.

4.6 Recreation and Aesthetics

The following discussion of impacts on recreational activities and aesthetic areas includes an analysis of impacts and a determination of impact duration and severity. Included in the discussion are elements of the project description that would both produce impacts and are proposed to minimize potential impacts. Applicant-proposed measures for minimizing potential environmental impacts are those that have been committed to by the Applicant and incorporated into the project design, and are listed in **Section 4.11**. If further measures are recommended by agencies to mitigate potential adverse impacts, they are stated at the end of each analysis and in **Section 4.11**. For analyses where no mitigation measures are stated, none have been identified to further reduce potential adverse impacts.

4.6.1 Impacts of the Proposed Action

4.6.1.1 Construction

Port construction equipment would be located at the site of the Project for the duration of construction. Pipeline construction equipment would move toward the proposed Port location from onshore. It is anticipated that no recreational or commercial boating activities would be allowed in the construction zones. Boaters in the OCS would be able to see construction vessels and some buoy components above the water line in MMS blocks PB545 and PB589. Visible vessels and components from the Port are consistent with current uses in these areas. It is common to see large deepwater vessels in Tampa Bay and Port Manatee. There would be no construction within the Egmont shipping channel or constructed waterways within Tampa Bay, therefore shipping lanes would not be delayed due to construction of the Proposed Action. Overall, short-term, minor, direct and indirect, adverse impacts on recreational fishing from the proposed Port installation would include temporary exclusion during the proposed Port and pipelines construction due to noise disturbance in the work area, and an increase in sediment loads during installation.

Visual resources would be impacted during the construction of the Port Dolphin port and pipelines. The proposed pipeline route would alter visual resources in three ways: (1) the construction workforce, equipment, and activity would temporarily alter viewscapes; (2) maintenance of the ROW would alter vegetation patterns; and (3) construction and operation of the aboveground valve station and

interconnection station would permanently alter the viewscape. Construction would be visible to recreational boaters, residents, and visitors for the duration of the construction. Impacts could be adverse or beneficial, depending on the perception of the affected person. From the water, the viewscape would represent one of several industrial projects along the coastline for the area. Onshore, the pipeline and facilities would be located in mostly commercial and industrial areas. Furthermore, a portion of the proposed pipeline would traverse a small recreational area that contains a 500-foot airplane runway. The pipeline would run along the road and not directly impact the runway, but use would be limited during construction activities. Therefore, short-term, minor, direct, and indirect, adverse impacts on recreation and aesthetics would occur during the construction of the proposed Port.

4.6.1.2 Operations

As indicated in **Figure 4.6-1**, the Port facilities would be hardly visible to the naked eye from the shore. In Federal waters, the viewscape for boaters and fishermen would be consistent with current sights and viewscapes already in the area. Therefore, negligible, direct and indirect, adverse impacts on recreation and aesthetics would be expected from the operation of the deepwater port.

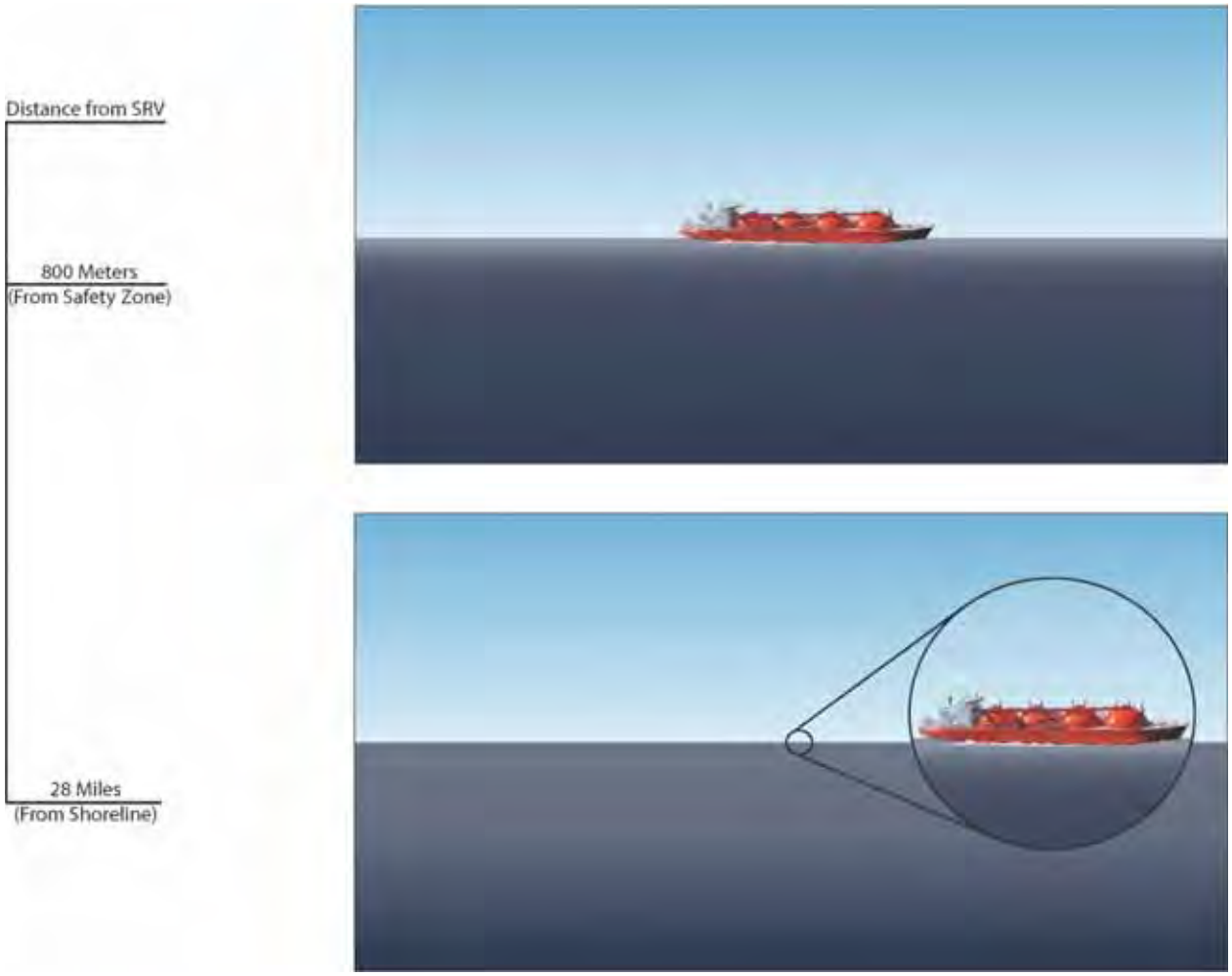


Figure 4.6-1. Viewscape of an SRV at Port from the Closest Offshore and Onshore Vantage Points

During operation, interconnection facilities and the valve station would be aboveground onshore. These facilities would alter the viewscape for the life of the Project. The Maritime Administration and the USCG have recommended the Applicant fence and screen aboveground facilities adjacent to the ROW. Depending on the success of the growth, the plantings would improve the viewscape by creating a more natural landscape than allowed by the aboveground facilities. The FERC and the Applicant have developed BMPs to avoid and reduce impacts on resources impacted by the Project. BMPs are industry standards developed through lessons learned. BMPs can become regulations or agency permit requirements which are required to effectively reduce impacts on natural resources. Mitigations and BMPs are outlined in **Section 4.11**.

4.6.1.3 Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Therefore, impacts on recreational and aesthetic features are expected to be reduced, although a specific timeline would be developed at the time of decommissioning and abandonment.

Decommissioning activities would result in restrictions similar to those described for the construction process. Due to the in-place abandonment procedures for the pipeline, decommissioning activities are anticipated to take less time than construction. Therefore, impacts on recreational and aesthetic features are expected to be reduced, although a specific timeline would be developed at the time of decommissioning and abandonment.

4.6.2 Alternatives

As discussed in **Section 2.1**, the Maritime Administration and USCG considered several alternatives to the Proposed Action that also meet the purpose and need. This section compares the alternatives to the Proposed Action to broaden the scope of options that might be available to reduce or avoid impacts associated with the Proposed Action with respect to recreation and aesthetics. **Table 4.6-1** compares impacts from the Proposed Action to each of the alternatives with respect to recreation resources.

Impacts on recreational and aesthetic resources would be similar to the Proposed Site and Route Alternative. This alternative is approximately 6.4 km (4 mi) longer than the Proposed Site and Route Alternative; therefore, construction would take an estimated 4 additional days, resulting in a longer restriction in the construction safety zone and a longer timeframe for visual impacts.

During operation, interconnection facilities and the valve station would be aboveground onshore. These facilities would alter the viewscape for the life of the Project. The Maritime Administration and the USCG have recommended the Applicant fence and screen aboveground facilities adjacent to the ROW. Depending on the success of the growth, the plantings would improve the viewscape by creating a more natural landscape than allowed by the aboveground facilities. The FERC and the Applicant have developed BMPs to avoid and reduce impacts on resources impacted by the Project. BMPs are industry standards developed through lessons learned. BMPs can become regulations or agency permit requirements which are required to effectively reduce impacts on natural resources. Mitigations and BMPs are outlined in **Section 4.11**.

4.6.1.3 Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Therefore, impacts on recreational and aesthetic features are expected to be reduced, although a specific timeline would be developed at the time of decommissioning and abandonment.

Decommissioning activities would result in restrictions similar to those described for the construction process. Due to the in-place abandonment procedures for the pipeline, decommissioning activities are anticipated to take less time than construction. Therefore, impacts on recreational and aesthetic features are expected to be reduced, although a specific timeline would be developed at the time of decommissioning and abandonment.

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Impacts on recreational and aesthetic resources would be similar to the Proposed Site and Route Alternative. This alternative is approximately 6.4 km (4 mi) longer than the Proposed Site and Route Alternative; therefore, construction would take an estimated 4 additional days, resulting in a longer restriction in the construction safety zone and a longer timeframe for visual impacts.

4.6.2.1 Southern Site and Route Alternative

Impacts on recreational and aesthetic resources would be similar to the Proposed Site and Route Alternative.

4.6.2.2 Offshore Interconnection with the Gulfstream Pipeline Alternative

Impacts on recreational and aesthetic resources would be similar to the Proposed Site and Route Alternative. This alternative is approximately 39 km (18 mi) shorter than the Proposed Site and Route Alternative; therefore, the construction timeframe would be reduced by 40 days, resulting in a shorter timeframe for visual impacts.

4.6.2.3 FSRU Port Design Alternative

Impacts on recreational and aesthetic resources would be similar to the Proposed Site and Route Alternative.

4.6.2.4 AAV Vaporization Technology Alternative

Construction, operation, and decommissioning impacts under the AAV Vaporization Technology Alternative would be similar to those under the Proposed Action.

4.6.2.5 Suction Piles Anchoring Alternative

Construction, operation, and decommissioning impacts under the Suction Piles Anchoring Alternative would be similar to those under the Proposed Action.

4.6.2.6 No Action Alternative

The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural

gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, no adverse impacts from pipeline installation on Florida recreational or aesthetic resources would be expected. There would be no minor, short-term impacts as a result of construction through those areas. No impacts on people who enjoy the aesthetic and recreational areas would be expected. Means to satisfy the Nation's energy demands might result in increased use of existing land-based terminals, greater reliance on declining domestic oil and gas resources, or development of alternate means of importing LNG.

Alternative sources of natural gas can include other Deepwater LNG Ports or onshore LNG terminals. Other deepwater LNG ports would have impacts on recreational and aesthetic areas that are similar to Port Dolphin but in a different geographic location. Onshore LNG terminals would be constructed on the already limited coastal landscape, restricting use of those areas for other uses such as residential or retail commercial. Due to limited industrial areas along the coast for LNG siting, several LNG facilities might be in close proximity increasing the risk of explosion that might affect the local community. As energy demands grow, onshore LNG facilities would need to expand industrial areas, restricting use of adjacent lands.

Table 4.6-1. Recreation and Aesthetics Impact Comparison for Each Alternative

Impact	Proposed Action	Southern Site and Route Alternative	Offshore Interconnection with Gulfstream Pipeline Alternative	FSRU Port Design Alternative
Restricted recreation and commercial fishing during construction	11 months	+4 days	-40 days	Short-term impacts comparable to Proposed Action.
Restricted recreational boating activities during construction	11 months	+4 days	-40 days	Short-term impacts comparable to Proposed Action.
Construction visibility near and onshore (aesthetics)	11 months	+4 days	-40 days	Short-term impacts comparable to Proposed Action.
Operations restriction on boating and fishing activities	Long-term impacts within the Safety Zone, ATBA and NAA.	Long-term impacts comparable to Proposed Action.	Long-term impacts comparable to Proposed Action.	Long-term impacts comparable to Proposed Action.
Operation visibility (aesthetics)	Long-term impacts minor from shore.	Long-term impacts comparable to Proposed Action.	Long-term impacts comparable to Proposed Action.	Long-term impacts comparable to Proposed Action, but slightly greater.

Notes:

Timelines are based on pipeline length and assume the construction methods are similar between alternatives.

There would be no impacts from the No Action Alternative.

The AAV Vaporization and Suction Pile Anchoring Alternatives were carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.7 Air Quality

This section addresses potential impacts on air quality associated with the Project, potential alternatives, and the No Action Alternative. Short-term, moderate, direct, adverse impacts on air quality would occur during construction of the deepwater Port, pipelines, and onshore facilities. Air quality impacts have been evaluated for both the pipeline facility and the interconnection station under the following conditions: emissions/impacts due to short-term construction activities associated with mobile emissions/sources; and emissions/impacts due to long-term, routine operations associated with stationary emission sources (the interconnection station).

The following discussion of air quality impacts includes an analysis of impacts and a determination of impact duration and severity. Included in the discussion are elements of the project description that would both produce impacts and are proposed to minimize potential impacts. Applicant-proposed measures for minimizing potential environmental impacts are those that have been committed to by the Applicant and incorporated into the project design, and are listed in **Section 4.11**. If further measures are recommended by agencies to mitigate potential adverse impacts, they are stated at the end of each analysis and in **Section 4.11**. For analyses where no mitigation measures are stated, none have been identified to further reduce potential adverse impacts.

Construction-related activities and emissions for the pipeline and station facility do not require Federal, state, or local air quality permit authorization due to their short-term duration. However, long-term, routine emissions from the interconnection station do require FDEP permit authorization under F.A.C. Rule 62-210.300, and construction of the station cannot commence until an FDEP air quality permit authorization is granted. An FDEP air quality, minor source construction permit application would be prepared and submitted for authorization of the interconnection station. The main sources of emissions during construction would be the diesel engines used aboard the pipeline/derrick barge, anchor-handling tug supply (AHTS) vessels, crew boat, and supply boat. During operation of the Port, emissions from the SRV vaporization boilers and power generation engines are the primary source of air emissions and would have a direct, adverse impact on air quality during the life of the Project. Short-term, minor, direct, adverse impacts would be created by the SRVs as they transit to and from the buoys, and from the standby generators onshore, when they are in operation.

Air quality impacts associated with the Project are expected to be minor. No sensitive receptors would be exposed to substantial increases in pollution concentrations. No substantial increase in emissions of greenhouse gases would occur (greenhouse gas emissions are addressed in **Section 7**). Increased emissions of criteria pollutants from Port operations would exceed the New Source Review threshold under the CAA; impacts onshore would not be major. Mitigation of impacts in the Port vicinity would be achieved by incorporating Best Available Control Technology (BACT) to limit SRV emissions.

Potential air pollutant emissions and impacts were assessed for a number of design alternatives. Emissions for construction and decommissioning for the pipeline installation and interconnection were estimated for three route alternatives: the Proposed Site and Pipeline Route, the Southern Site and Route Alternative, and the Offshore Interconnection to Gulfstream Pipeline Alternative. Anticipated construction activities for the Port are not affected by the Port location and the associated pipeline route. For the FSRU Port Design Alternative, potential air pollutant emissions and impacts for construction, operation, and decommissioning were assessed.

4.7.1 Impacts of the Proposed Action

4.7.1.1 Construction

Regulated criteria pollutants and HAPs would be emitted during construction of the Port, offshore pipelines, and onshore terminals. Construction activities occurring at the Port site would include installation of driven piles, anchors, chains, buoys, and flexible risers. Construction at the Port would take approximately 3.5 months.

The emissions generated during construction of offshore natural gas pipelines would be expected to cause short-term, minor, direct, adverse impacts on air quality in the vicinity of the Port and along the pipeline route extending from the Port to the terminal at Port Manatee. Construction activities would cause a temporary reduction of local ambient air quality due to emissions generated by auxiliary mobile equipment working offshore from pipeline construction. These emissions would come from fuel combustion and would consist primarily of NO_x and CO_2, in addition to smaller amounts of VOCs, PM_{10}, and SO_2.

The pipeline installation (including the surveys, gas transmission line, flowline, manifolds, hot-tap, hydrostatic testing, and mattress installations) would take approximately 6 months. Certain manufactured components (e.g., anchor piles, mooring lines, gas transmission pipeline, manifolds and flowlines, unloading buoys, and miscellaneous consumables) would be shipped to the region, stored temporarily at an existing onshore staging yard, and transported for offshore installation. Emissions associated with manufacturing of these components would occur away from the Project area. Transport for offshore installation would be accomplished using supply vessels.

During pipeline construction activities, the construction equipment would be moved along the pipeline route as construction proceeds. A pipe-lay/derrick barge would be stationed along the pipeline route, plowing the trench and then laying each section of the pipeline. It would then be moved to the next location along the pipeline route. Therefore, the total emissions from the construction activities would be dispersed along the construction route.

Emissions during construction of the onshore components are primarily associated with diesel engine emissions from trucking operations, trenching equipment, and pipe-laying equipment, including a heavy-lift crane. All these construction activities are mobile sources. **Table 4.7-1** presents the estimated emissions during construction. Under the CAA, regulatory thresholds generally do not apply to temporary, construction-related emissions from mobile sources.

Table 4.7-1. Estimated Emissions During Construction (Proposed Route)

Project Component	NO_x (tpy)	CO (tpy)	SO_2 (tpy)	$PM_{10}/PM_{2.5}$ (tpy)	VOC (tpy)	H_2SO_4 (tpy)
Port	235.1	58.5	3.0	7.45	7.5	2.0
Pipeline (offshore)	417.95	95.75	5.0	7.12	11.3	3.3
Total – offshore (tpy)	**653.1**	**154.3**	**8.0**	**14.6**	**18.8**	**5.3**
Pipeline (onshore)	23.74	5.11	1.56	1.68	1.88	0.0
Interconnection Station	5.35	1.15	0.35	0.38	0.42	0.0
Total – onshore (tpy)	**29.1**	**6.3**	**1.9**	**2.1**	**2.3**	**0.0**

Source: Port Dolphin 2008c

Air Quality Impacts of Onshore Construction Activities (Pipeline and Interconnection Station). An air modeling analysis for criteria pollutants was performed using USEPA's SCREEN3 model. The analysis provides a preliminary assessment of ambient air quality impacts during construction of the proposed pipeline and interconnection station, as summarized in **Table 4.7-2.** Results of this highly conservative "worst-case" modeling assessment indicate that potential impacts could exceed NAAQS/FAAQS limits.

Table 4.7-2. Air Quality Impacts of Onshore Construction Activities Predicted by SCREEN3

Pollutant	Averaging Time	NAAQS (µg/m^3)	FAAQS (µg/m^3)	Impact Concentration (µg/m^3)
CO	1-hour	40,000	40,000	10,600
	8-hour	10,000	10,000	7,231
NO_2	Annual	100	100	116
PM_{10}	24-hour	150	150	846
$PM_{2.5}$	24-hour	35		740
	Annual	15		46
SO_2	3-hour	1,300	1,300	1,766
	24-hour	365	260	757
	Annual	80	60	46

Source: Port Dolphin 2008c

In response to Federal, state, and local requirements, BMPs have been included in project design or proposed by the Applicant to reduce environmental impacts. Construction activities are intermittent/short-term events associated with mobile construction sources. Any impacts would be expected to be temporary and would be confined to the immediate vicinity of the construction site. As such, onshore construction activities would not contribute to long-term impacts and would not be subject to Federal or state permit requirements.

4.7.1.2 Operations

During Port operations, the sources of air emissions would consist of the boilers, power generation engines, and thermal oxidizers on each of the SRVs accessing the Port; supply vessel engine emissions in transit and at the Port; and the emergency engines at the onshore interconnection station. This section provides a summary of potential criteria pollutant and HAPs emissions associated with operation of the Port.

Operating Scenarios. Two unloading buoys would be utilized so that natural gas can be delivered in a continuous flow by overlapping the arrival and departure of SRVs. Up to two SRVs would operate within the Safety Zone at any time. The SRVs would vaporize and deliver up to a combined 1,200 MMscfd of natural gas into the Port Dolphin pipeline system. The maximum regasification capacity of each SRV would be 1,200 MMscfd of natural gas. The maximum throughput capacity of the buoy system is also 1,200 MMscfd, and therefore, one SRV is capable of fully utilizing the deepwater Port. The LNG storage capacity of each SRV would not exceed an estimated 217,000 m^3. The worst-case scenario from an emissions perspective has two 217,000 m^3 SRVs supplying the Port with natural gas, where each SRV would regasify with approximately 50 percent of its installed regasification capacity (i.e., 600 MMscfd per vessel).

While moored at the unloading buoys, vaporization and ship hoteling activities would be conducted onboard the SRVs. Under the worst-case emissions scenario, the emissions sources on each SRV would operate in the following manner:

- Up to four 278 MMBtu/hr natural gas-fired marine boilers, equipped with low-NO_x burners and SCR for NO_x emissions reduction. These boilers are used for LNG vaporization while docking at the buoy. When two SRVs are docked at the Port simultaneously, both SRVs would not be able to vaporize LNG at full capacity. Cumulative operation of all boilers from all SRVs in the exclusion zone would not exceed 1,112 MMBtu/hr.
- Two dual-fuel (DF) engines with capacity of 11.4 MW each, plus one DF engine with capacity of 5.7 MW, all equipped with SCR to reduce NO_x emissions and with oxidation catalysts to reduce CO and VOC emissions. These engines provide electrical power for SRV positioning, LNG vaporization, and hoteling. Engines would operate in natural gas combustion mode while the SRV is in the exclusion zone; less than one percent of fuel energy would be provided by low-sulfur distillate fuel oil.
- Two additional DF engines with capacity of 11.4 MW each, without emissions controls. These engines would be used for propulsion and would not operate within the approach or exclusion zones.
- One 220-MMBtu/hr vapor combustor that would only be used during upset conditions. The vapor combustor provides the capability to burn off LNG to relieve excess pressure in the LNG tanks during initial hookup to the buoy or during periods with low gas send-out.

At any given time, there can be up to two SRVs within the exclusion zone. Each SRV would operate within the following limits:

- The maximum heat load from all boilers may not exceed 556 MMBtu/hr.
- The maximum cumulative engine operation may not exceed 14.93 MW. Only engines with emissions controls may operate.

Support vessels would also operate within the exclusion zone, including one crew boat with a 700-horse-power (hp) diesel engine and one supply boat with a 700-hp diesel engine. Each support vessel would operate within the exclusion zone for no more than 1 hour per day.

The potential effects of the routine activities on local and regional air quality conditions near the Port site are determined by the air pollutant emissions from the Project and the effect of those emissions on existing ambient air quality, based on the results of the air dispersion modeling. Emissions from offshore operations are expected to produce moderate impacts in the vicinity of Port, and no major impact onshore or at Class I Areas. Emissions from the onshore interconnection station would have the potential to produce high (intermittent) short-term impacts in the immediate vicinity of the station, with no major impact at Class I Areas.

Operation of onshore facilities would also produce air emissions. Proposed onshore emissions sources include a 402-hp standby diesel generator at the Gulfstream Interconnect station and a 91-hp standby diesel generator at the TECO Interconnect station. Routine operation of these generators would be limited to 2 hours per week for testing and maintenance.

Criteria Pollutant Emissions. The criteria pollutant emissions are based on information obtained by the Applicant from representative equipment suppliers, plus standard USEPA emissions factors. Marine boiler NO_x emissions are based on 10 ppm by volume, on a dry basis (ppmvd), corrected to 3 percent

oxygen (O_2). This NO_x emissions level is expected to be achieved by the application of low-NO_x burner (LNB) technology, in combination with SCR. According to the representative manufacturer, CO emissions at full load are expected to be 10 ppmvd at 3 percent O_2. These NO_x and CO outlet concentrations are equivalent to emissions levels of approximately 0.037 lb/MMBtu and 0.015 lb/MMBtu, respectively. The emissions of the other criteria pollutants (i.e., PM_{10}, SO_2, and VOCs) are based on the appropriate emissions factors cited for natural gas combustion, as adjusted for the design heating value of natural gas, in the USEPA's AP 42 *Compilation of Air Pollutant Emission Factors*, (USEPA 2000). The maximum hourly and annual criteria pollutant emissions from the SRV vaporization boilers are summarized in **Table 4.7-3**.

Table 4.7-3. Potential Criteria Pollutant Emissions from SRV Vaporization Boilers

Pollutant	Emissions Factor (lb/MMBtu)	Emissions (lb/hr/boiler)	Maximum Hourly Emissions (lb/hr)[a]	Annual Emissions (tpy)[b]
PM_{10}	0.00745	2.28	9.11	39.92
SO_2	0.0006	0.13	0.51	2.25
NO_x (as NO_2)	0.037	11.31	45.26	198.23
CO	0.015	4.59	18.35	80.36
VOC (as CH_4)	0.005	1.465	6.60	28.88
Ammonia (NH_3)[c,d]	0.00449	1.37	5.49	24.03
H_2SO_4[d]	N/A	0.084	0.34	1.48
Pb	< 0.001	< 0.001	< 0.001	0.003

Emissions factor source: USEPA 2000

Notes:

a. Hourly emissions are based on four vaporization boilers each rated at 276 MMBtu/hr per boiler.

b. Annual emissions are based on the maximum daily send-out rate of 1,200 MMscfd.

c. Emissions factors for ammonia correspond to SCR ammonia slip of 10 ppm.

d. Ammonia and sulfuric acid are not regulated as criteria pollutants.

N/A = Not applicable

The PM_{10}, NO_x, CO, and VOC emissions for the power generation engines are based on information obtained by the Applicant from a representative engine manufacturer. The SO_2 emissions were based on the use of low-sulfur diesel fuel with maximum sulfur content of 0.05 percent by weight. The maximum hourly and annual criteria pollutant emissions from the power generation engines are summarized in **Table 4.7-4**.

Potential annual emissions of criteria pollutants from all sources during routine operations are summarized in **Table 4.7-5**. Potential emissions of NO_x, VOC, and CO exceed the major source threshold of 100 tpy.

Hazardous Air Pollutant Emissions. The HAPs emissions from routine operations were estimated using USEPA emissions factors from the AP-42 and USEPA's Factor Information Retrieval (FIRE) databases (USEPA 2000). The maximum hourly and annual HAPs emissions are summarized in **Table 4.7-6**. As shown in this table, the Project would not qualify as a major HAPs source; the maximum emissions rate for any individual HAP is less than 10 tpy and the highest emissions rate of all HAPs combined is less than 25 tpy.

Table 4.7-4. Potential Criteria Pollutant Emissions from Power Generation Engines

Pollutant	Emissions Factor (g/kWh)	Emissions (lb/hr/engine)	Maximum Hourly Emissions (lb/hr)[a]	Annual Emissions (tpy)[b]
PM_{10}	0.0065	0.18	0.72	3.14
SO_2	N/A	3.13	12.52	54.84
NO_x (as NO_2)	0.20	5.52	22.10	96.78
CO	0.165	4.56	18.23	79.84
VOC (as CH_4)	0.15	4.14	16.57	72.58
NH_3[c,d]	N/A	0.42	1.66	7.28
H_2SO_4[d]	N/A	2.05	8.22	36.0

Notes:

a. Maximum hourly emissions are based on four power generation engines each rated at 11.4 MW.

b. Total annual emissions are based on the maximum daily send out rate of 1,200 MMscfd.

c. Ammonia emissions are based on SCR ammonia slip of 10 ppmvd at 3 percent O2.

d. Ammonia and sulfuric acid are not regulated as criteria pollutants.

N/A = Not applicable

Table 4.7-5. Criteria Pollutant Emissions from Deepwater Port Routine Operations

Pollutant	Maximum Emissions (lb/hr)	Annual Emissions (tpy)
$PM_{10/2.5}$	10.39	43.13
SO_x	13.43	57.13
NO_x	100.96	298.96
CO	44.28	161.11
VOC	24.16	101.59
NH_3[a,b]	7.152	31.33
H_2SO_4[b]	8.81	37.5
Lead	< 0.001	0.0026

Note:

a. Ammonia emissions are based on SCR ammonia slip of 10 ppmvd at 3 percent O2.

b. Ammonia and sulfuric acid are not regulated as criteria pollutants.

Table 4.7-6. Potential HAPs Emissions from SRV Vaporization Boilers and Power Generation Engines

Pollutant	Maximum Emissions (lb/hr)	Annual Emissions (tpy)
Formaldehyde	0.93	4.07
Benzene	0.30	1.27
Toluene	0.11	0.47
Xylene	0.072	0.31
n-Hexane	2.16	9.45
Acetaldehyde	0.0093	0.041
Acrolein	0.0029	0.013
Naphthalene	0.05	0.21
HAP (other VOC)	0.0023	0.01
Arsenic	< 0.001	0.001
Beryllium	< 0.001	< 0.001
Cadmium	0.0013	0.006
Chromium	0.0017	0.0074
Cobalt	< 0.001	< 0.001
Manganese	< 0.001	0.002
Mercury	< 0.001	0.0014
Nickel	0.0025	0.011
Selenium	< 0.001	< 0.001
Total – all HAPs		**15.9**

Source: Port Dolphin 2008c

Emissions from Interconnection Station. Potential sitewide emissions for the interconnection station are summarized in **Table 4.7-7**. Emissions sources include fugitive emissions from process components, condensate tank (capacity 350 barrels), and a 91-hp standby generator. Emissions are below the major source threshold of 100 tpy for all criteria pollutants. An FDEP minor stationary construction air quality permit would be required under F.A.C. Rule 62-210.300.

Potential HAPs emissions for the interconnection station are summarized in **Table 4.7-8**. Emissions from the interconnection station would not qualify as a major HAPs source, since the maximum emissions rate for any individual HAP is less than 10 tpy and the highest emissions rate of all HAPs combined is less than 25 tpy.

Once construction activities are completed, emissions generated during operation of the offshore pipelines are not expected to cause adverse impacts on air quality in the vicinity of the Port. The pipelines would be installed underwater, and would be closed systems. Only minor emissions of natural gas, called fugitive emissions, would occur at pipeline connections. Because these fugitive emissions are very small, they are not regulated by permit or source-specific requirements. Any leaks found would be repaired and would be subject to more rigorous monitoring until fugitive emissions were reduced.

Table 4.7-7. Potential Sitewide Emissions at the Interconnection Station

Interconnection Station Sitewide Total Emissions		
Compound	**Emissions Rate**	
	lb/hr	**tpy**
VOC	10.11	41.43
H_2S	0.094	0.41
NO_x	2.81	0.15
CO	0.60	0.031
$PM_{10/2.5}$	0.20	0.010
SO_2	0.19	0.010

Source: Port Dolphin 2008c

Table 4.7-8. Potential HAPs Emissions at the Onshore Interconnection Station

Interconnection Station Sitewide Total HAP Emissions		
Compound	**Emission Rate**	
	lb/hr	**tpy**
Formaldehyde	0.00075	3.89E-05
Benzene	0.0219	0.0949
Toluene	0.0048	0.0179
Ethylbenzene	0.0018	0.0090
Xylene	0.0086	0.036
1,3-Butadiene	2.48E-05	1.29E-06
Acetaldehyde	0.00049	2.53E-05
Acrolein	5.86E-05	3.05E-06
Naphthalene	5.37E-05	2.79E-06
n-Hexane	0.194	0.853
Total HAP	**0.235**	**1.011**

Source: Port Dolphin 2008c

LNG Release. Although natural gas is not a criteria pollutant, releases of unburned natural gas could contribute to the formation of certain criteria pollutants (e.g., particulate matter) and could have an adverse impact on air quality. In addition, methane (a component of natural gas) has been identified by USEPA as a greenhouse gas, releases of which could contribute to global warming. Operation of the Project is not expected to result in releases of LNG or vaporized natural gas (other than minor fugitive emissions from system leakage), unless an accident occurs. Estimated emissions of CH_4 from routine operations are discussed in **Section 7** under ***Greenhouse Gasses***. Accidental releases of LNG or vaporized natural gas could, however, present localized safety concerns, which are discussed in **Section 5**.

Dispersion Modeling and Results. The impacts of routine operational activities on ambient air quality were predicted from 3 years of modeling (i.e., 1990, 1992, and 1996) using the CALPUFF dispersion model (Version 5.711a). Receptors were placed around the perimeter of the exclusion zone surrounding the deepwater Port, around the property line of onshore facilities, at identified Class II sensitive areas, and at two Class I areas (Chassahowitzka NWR and Everglades National Park). Emissions sources included in CALPUFF modeling of routine operations include sources associated with both the deepwater Port and the interconnection station.

A three-dimensional field of meteorological variables for the CALPUFF modeling domain was developed using the CALMET meteorological processor (Version 5.53a). Mesoscale data sets developed using the mesoscale meteorological models MM4 and MM5 provided initial fields for the CALMET analysis. The mesoscale fields for 1990, 1992, and 1996 have been widely distributed and approved for use by FLMs, and were specifically approved by FWS and USEPA for use in this application (Port Dolphin 2007j). The CALMET analysis incorporated hourly wind, temperature, and cloud cover data from 37 surface stations, plus twice daily temperature and wind profile measurements from six upper air stations.

The dispersion results from the Port Dolphin project were compared to the Class I and Class II SILs. These results are summarized in **Tables 4.7-9** and **4.7-10**, respectively. Predicted air quality concentrations at Class I Area receptors are all below the Class I SILs by at least a factor of 10, reflecting the distance (more than 100 km) between offshore emissions sources and the nearest Class I areas. Peak predictions at Class I and II areas include impacts from both onshore and offshore sources. Predicted impacts at Class II receptors are below the SILs for all pollutants. (The CALPUFF modeling results for the interconnection station were overly conservative. The standby generators were modeled as operating constantly at full load. CALPUFF predictions for receptors immediately adjacent to the interconnection station were therefore omitted from **Table 4.7-10**. In its review of the Project's application for a CAA preconstruction permit as discussed in **Section 3.7.3**, USEPA could require the Applicant to use the most recently approved versions of dispersion modeling software, and the results might differ from the results presented in the EIS. A separate analysis for the interconnection station using SCREEN3 is described below.)

Modeling Results for the Interconnection Station. In light of the CALPUFF modeling results showing major impacts in the vicinity of the interconnection station, additional air modeling was performed using USEPA's SCREEN3 model to assess impacts for CO, NO_2, PM_{10}, $PM_{2.5}$, and SO_2. The SCREEN3 analysis reflects more accurate estimates for both routine emissions from the emergency generator and source-receptor distances. Comparison of SCREEN3 model predictions with Class II SILs is provided in **Table 4.7-11**. Results show that emissions from routine operations of the station would not exceed SILs, and therefore would cause a minor to moderate contribution to an exceedance of NAAQS and FAAQS limits.

The dispersion modeling results were also compared to the NAAQS and FAAQS, combining project impacts with worst-case air quality background concentrations. The results are presented in **Table 4.7-12**. These results demonstrate that, absent impacts from any existing nearby emissions sources, the impacts of the Project alone, plus background, do not exceed any ambient air quality standards.

Air Quality-Related Values. The Port is within 300 km (186 mi) of two Class I areas, the Chassahowitzka NWR (150 km) and Everglades National Park (244 km). Impacts of Port operations on AQRVs at these Class I areas were evaluated as part of the CALPUFF modeling analysis.

Table 4.7-9. Predicted Ambient Air Quality Impacts at Class I Areas

Pollutant	Averaging Period	Highest Modeled Concentration (µg/m^3)	PSD Class I Increment (µg/m^3)	Class I Significant Impact Level (µg/m^3)
NO_x	Annual	0.0007	2.5	0.1
SO_2	3-hour	0.028	25	1.0
	24-hour	0.018	5	0.2
	Annual	0.0004	2	0.1
$PM_{2.5}$	24-hour	0.030	N/A	N/A
	Annual	0.0004	N/A	N/A
PM_{10}	24-hour	0.030	8	0.32

Source: Port Dolphin 2008c

Table 4.7-10. Predicted Peak Impacts from Routine Operations at Class II Receptors

Pollutant	Averaging Period	Highest Modeled Concentration (µg/m^3)	PSD Class II Increment (µg/m^3)	Class II Significant Impact Level (µg/m^3)
NO_x	Annual	0.2	25	1
CO	1-hour	81	N/A	2,000
	8-hour	46	N/A	500
SO_2	3-hour	23.7	512	25
	24-hour	3.2	91	5
	Annual	0.1	20	1
$PM_{2.5}$	24-hour	2	N/A	N/A
	Annual	0.1	N/A	N/A
PM_{10}	24-hour	11	30	5

Source: Port Dolphin 2008c

Table 4.7-11. SCREEN3 Predicted Impacts of Interconnection Station Routine Operation on Ambient Air Quality

Pollutant	Averaging Period	Highest Modeled Concentration (µg/m^3)	Class II Significant Impact Level (g/m^3)
NO_2	Annual	0.55	1
CO	1-hour	36	2,000
	8-hour	6.3	500
SO_2	3-hour	6.7	25
	24-hour	0.4	5
	Annual	0.01	1
$PM_{2.5}$	24-hour	0.4	5
	Annual	0.01	1
PM_{10}	24-hour	0.4	5

Source: Port Dolphin 2008c

Table 4.7-12. Predicted Worst-Case Impacts on Ambient Air Quality

Pollutant	Averaging Period	Highest Modeled Concentration µg/m^3)	Ambient Background (µg/m^3)	Total (µg/m^3)	NAAQS (µg/m^3)	FAAQS (µg/m^3)
NO_x	Annual	0.2	17	17.2	100	100
CO	1-hour	81	5,029	5,110	40,000	40,000
	8-hour	46	3,429	3,485	10,000	10,000
SO_2	3-hour	23.7	266	289.7	1,300	1,300
	24-hour	3.2	99	102.2	365	260
	Annual	0.1	12	12.1	80	60
$PM_{2.5}$	24-hour	2.0	30.9	342.9	35	35
	Annual	0.1	12.4	12.5	15	15
PM_{10}	24-hour	11	99	110	150	150

Source: Port Dolphin 2008c

Regional Haze. Potential impacts of the Project on regional haze were evaluated following procedures recommended in FLAG 2000 (FLM 2000). Visibility change was evaluated using Method 2 (recommended by the Interagency Workgroup on Air Quality Modeling [IWAQM] (USEPA 1998) and the alternative Method 6. For Chassahowitzka NWR, the largest predicted extinction change is 3.60 percent, below the 5 percent contribution threshold, while the largest predicted Delta-Deciview change is 0.354, below the change threshold of 0.5. The peak impacts predicted at Chassahowitzka NWR reflect contributions from both onshore (interconnection station) and offshore (deepwater Port) emissions sources. Peak impacts on regional haze predicted at Everglades National Park are lower by more than a factor of two.

Acid Deposition. Potential impacts of air emissions from Project operation on acid deposition were evaluated using the CALPOST processor to analyze the predicted deposition rates. Predictions were compared to the deposition assessment threshold (DAT) of 0.01 grams per hectare per year (g/ha-yr), recommended for the eastern United States. For Chassahowitzka NWR, the largest predicted annual deposition rate is 0.0019 g/ha-yr, while the maximum prediction for Everglades National Park is 0.00042 g/ha-yr. These results demonstrate that predicted acidic deposition would be well below the DAT for both Class I areas.

In response to Federal, state, and local requirements, BMPs have been included in project design or proposed by the Applicant to reduce environmental impacts. Potential impacts of air emissions from project operations would be reduced by incorporation of operating restrictions and use of BACT on SRVs to limit pollutant emissions. Within the approach and exclusion zones, SRVs would only use those engines and boilers equipped with SCR control to limit NO_x emissions, and would only combust natural gas as fuel. These measures employ proven technology and would substantially reduce the potential impacts of the Project on air quality. BMPs are discussed in **Section 4.11**.

4.7.1.3 Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Impacts of air emissions from decommission of the Port are expected to have minor, temporary impacts in the vicinity of the Port (lower than from construction), with no major impact onshore or at Class I Areas.

Air pollutant emissions would result since there would be vessel activity associated with decommissioning. However, compared to installation activities, the shorter duration of decommissioning and use of fewer vessels would result in much lower emissions. Decommissioning would use a DSV and locally sourced barges and tugs, if available. **Table 4.7-13** shows estimated emissions for decommissioning activities. These emissions levels would be expected to cause a minor impact on air quality, would be temporary, and would cease upon completion of decommissioning.

Table 4.7-13. Estimated Emissions During Decommissioning

	NOx (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} $PM_{2.5}$ (tpy)	VOC (tpy)	H_2SO_4 (tpy)
Total	74.1	17.0	0.87	2.2	402.0	0.57

Source: Port Dolphin 2008c

4.7.2 Alternatives

Table 4.7-14 compares impacts from the Proposed Action to each of the alternatives with respect to air quality.

4.7.2.1 Southern Site and Route Alternative

The Southern Site and Route Alternative would be approximately 8 km (5 mi) longer than the Proposed Route. Certain emissions associated with the pipeline installation are typically dependent on the length of the pipeline. These include emissions from vessels associated with trenching, installing the pipeline, backfilling, and installing mats. The total CO_2 emissions for the construction, operation, and decommissioning activities for the Southern Route are 80,919 tons, or about 8,000 tons more than the Proposed Route Alternative.

4.7.2.2 Offshore Interconnection with Gulfstream Pipeline Alternative

Construction impacts for the offshore interconnection alternative are similar to the Proposed Action pipeline construction for the short-term air impacts, and would have shorter period of long-term air impacts based on a shorter route for the pipeline construction. Under this alternative, there would be lower impacts onshore from the pipeline construction than the proposed action. However, the impacts of

air emissions from the construction of the pipeline interconnect are higher on both the short-term and long-term emissions for the area in the vicinity of the offshore interconnection. There are no major impacts from this Proposed Action onshore or at the Class I area. The air emissions impacts from the Port construction would not be different under this alternative compared to the Proposed Action. The operation of the offshore interconnect has no air emissions associated and therefore no impact. If the offshore interconnect is capped off and left in place for decommissioning there would be little or no impact from the offshore interconnect.

4.7.2.3 FSRU Port Design Alternative

Construction and decommissioning impacts for the FSRU would be similar to that described for the proposed site. The potential air emissions for construction and decommission would be potentially slightly higher for the FSRU and AAV alternative compared to the Proposed Action depending on the structures required underwater for the FSRU and the mobile sources required to move the FSRU. More construction would be required at the Port for the alternative than the Proposed Action. The air impacts related to the ship maneuvers and the tugs that would be required for the FSRU alternative are significant when compared to the Proposed Action. Mobile source emissions could potentially be much higher than the Proposed Action. Therefore, potential air impacts from operation could be greater than the Proposed Action. Regarding decommissioning, emissions and impacts could be higher, lower, or similar to the Proposed Action depending on the underwater structures that remain in place.

4.7.2.4 AAV Vaporization Technology Alternative

Construction and decommissioning impacts for AAV alternative would be similar to that described for the Proposed Action. The potential air emissions for construction and decommissioning would be potentially slightly higher for the AAV alternative compared to the Proposed Action depending on the structures required underwater for the AAV. More construction would be required at the Port for this alternative than the Proposed Action. The potential changes in the air emissions related to the AAV operation compared to the proposed Project are small. In particular, the air impacts related to the ship maneuvers and the tugs that would be required for the FSRU and AAV alternative are much greater when compared to the Proposed Action. Mobile source emissions could potentially be much higher than the Proposed Action. The AAV operation has potentially lower emissions for the vaporization of the LNG. Therefore, potential air impacts from operation could be greater than the Proposed Action. Regarding decommissioning; emissions and impacts could be higher, lower, or similar to the Proposed Action depending on the underwater structures that remain in place.

4.7.2.5 Suction Piles Anchoring Alternative

Construction, operation, and decommissioning impacts under the Suction Piles Anchoring Alternative would be similar to those under the Proposed Action.

4.7.2.6 No Action Alternative

The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under this alternative, the additional infrastructure proposed by the Applicant would not be built and there would be no potential for impacts on air quality associated with the Project construction and operation. Means to satisfy the Nation's energy demands might result in increased use of existing land-based terminals, greater reliance on declining domestic oil and gas resources, or development of alternate means of importing LNG. Alternative sources of natural gas can include other Deepwater LNG Ports or onshore LNG terminals. Use of fuel sources other than natural gas would have the potential to cause adverse impacts on air quality, both regionally and nationally, that could be less than, equal to, or greater than the impact of the Project, depending on the nature of the alternative source.

Table 4.7-14. Summary of Impacts on Air Quality

Impact	Proposed Action	Southern Site and Route Alternative	Offshore Interconnection Alternative	FSRU Design Alternative
Impacts of air emissions from pipeline construction.	Moderate impacts along pipeline route; no significant impact at Class I Areas.	Short-term impacts comparable to Proposed Action; somewhat higher long-term impacts (longer route).	Short-term impacts comparable to Proposed Action; shorter long-term impacts (shorter route); lower impacts onshore.	No difference from Proposed Action.
Impacts of air emissions from Port construction.	Moderate impacts in vicinity of Port; no significant impact onshore or at Class I Areas.	Slight differences in impact from Proposed Action. Different location means higher impacts at some locations, lower elsewhere.	No difference from Proposed Action.	Short-term and long-term impacts higher than Proposed Action (more construction at Port).

Impact	Proposed Action	Southern Site and Route Alternative	Offshore Interconnection Alternative	FSRU Design Alternative
Impacts of air emissions from construction of pipeline interconnect.	High short-term (temporary) impacts in vicinity of inter-connect. No significant impact at Class I Areas.	No difference from Proposed Action	Higher short-term and long-term emissions and impacts than Proposed Action in vicinity of offshore interconnect; no significant impact onshore or at Class I Areas.	No difference from Proposed Action.
Impacts of air emissions from operation of Port.	Moderate impacts in vicinity of Port; no significant impact onshore or at Class I Areas.	Same emissions as Proposed Action. Slight differences in impact from Proposed Action. Different location means higher impacts at some locations, lower elsewhere.	No difference from Proposed Action.	AAV means lower emissions to vaporize LNG. Short-term and long-term emissions from Port might be higher, lower, or roughly the same, depending on emissions from LNGC and support vessels.
Impacts of air emissions from operation of interconnect station.	High (intermittent) short-term impacts in vicinity of interconnect. No significant impact at Class I Areas.	No difference from Proposed Action.	Offshore interconnect has no emissions, no impact.	No difference from Proposed Action.
Impacts of air emissions from decommission of Port.	Moderate, temporary impacts in vicinity of Port (lower than from construction). No significant impact onshore or at Class I Areas.	Same emissions as Proposed Action. Slight differences in impact from Proposed Action. Different Port location means higher impacts at some locations, lower elsewhere.	No difference from Proposed Action.	Emissions and impacts might be higher, lower, or roughly the same as Proposed Action, depending on what underwater structures are left in place.
Impacts of air emissions from decommission of interconnect station.	Moderate, temporary impacts in vicinity of Port and onshore interconnect (lower than from construction). No significant impact onshore or at Class I Areas.	No difference from Proposed Action.	Little or no impact. (Cap off and leave interconnect in place).	No difference from Proposed Action.

Notes:

There would be no impacts from the No Action Alternative.

The AAV Vaporization and Suction Pile Anchoring Alternatives were carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.8 Noise

The following discussion of noise impacts includes an analysis of impacts and a determination of impact duration and severity. Included in the discussion are elements of the project description that would both produce impacts and are proposed to minimize potential impacts. Applicant-proposed measures for minimizing potential environmental impacts are those that have been committed to by the Applicant and incorporated into the project design, and are listed in **Section 4.11**. If further measures are recommended by agencies to mitigate potential adverse impacts, they are stated at the end of each analysis and in **Section 4.11**. For analyses where no mitigation measures are stated, none have been identified to further reduce potential adverse impacts.

4.8.1 Impacts of the Proposed Action

This section addresses potential noise impacts associated with the proposed Project onshore and offshore. Project-related noise would be generated during construction and operation of the Port. The magnitude and frequency of noise can vary considerably over the course of the day and throughout the week. This variation would be caused in part by changing weather conditions and the equipment in use at the time.

4.8.1.1 Construction

Activities that would produce the greatest amount of airborne noise during construction include Port construction; pipe-laying; and vessel traffic for transporting equipment, materials, piles, and workers to the site. Activities that would produce the greatest amount of underwater noise during construction include mooring buoy anchor installation, pipe-laying, and construction vessel traffic. SRVs, buoys, and associated facility infrastructure would be built at a shipyard, so there would be no associated noise affecting the Project area. Onshore construction is expected to last approximately 3 months, so construction-related noise would be short-term. Offshore construction noise sources from installation of the STL buoys would occur approximately 45 km (28 mi) from land, whereas noise from the pipeline installation would occur in a phased process along the pipeline route. Construction time would be of short duration (6 months). Noise from vehicle traffic associated with construction is expected to be similar to other traffic currently in the Project area. Noise from pipeline construction activities is not expected to be much higher than other underwater noise construction activities near Tampa Bay. Noise from pile-driving would be higher than noise from other construction equipment. However, mitigation measures proposed by the Applicant, and other mitigation measures that might be required would help to reduce potential impacts on ambient noise levels and avoid potential impacts on marine mammals. Temporary behavioral changes of birds, fish, and ocean mammals in the immediate area of active construction could occur during relatively brief periods of time.

Onshore construction from the installation of the Port Dolphin pipeline would occur over a 3-month period near Port Manatee in Tampa Bay. Standard onshore pipeline construction equipment would be used including backhoes, dump trucks, cranes, bulldozers, and side-booms.

Noise levels in suburban neighborhoods typically range from 50 to 60 dBA during the day and 40 to 50 dBA at night (FHWA 1980). The pipeline construction activity closest to residential receptors would occur in Manatee County, Florida, near Port Manatee within Tampa Bay. The closest residence would be approximately 122 m (400 feet) south of the proposed onshore pipeline route. At this distance, noise from construction activities would be approximately 70 to 75 dBA. Port Dolphin pipeline construction noise would have a short-term, direct, minor impact on sound levels in the vicinity of the construction activities.

Construction noise impacts associated with the installation of the STL buoy system would occur approximately 45 km (28 mi) offshore. A noise level of 90 dBA would dissipate to about 20 dBA 45 km (28 mi) away. Consequently, offshore construction noise would not impact populations onshore.

Two measurements used by some Federal agencies to relate the time-varying quality of environmental noise to its known effects on people are the equivalent sound level (L_{eq}) and the day-night sound level (L_{dn}). The L_{eq} is an A-weighted sound level containing the same sound energy as the instantaneous sound levels measured over a specific time period. Noise levels are perceived differently, depending on length of exposure and time of day. The L_{dn} takes into account the duration and time the noise is encountered. Late night and early morning (10:00 pm to 7:00 am) noise exposures are penalized +10 decibels, to account for people's greater sensitivity to sound during the nighttime hours.

Construction of the proposed pipeline and tie-in of the pipeline from Port Manatee to the interconnection station would result in temporary increases in the ambient noise level. Construction noise levels would vary during the construction period, depending on the activity and the construction phase. There are no known noise sensitive areas (NSAs) within 610 m (2,000 feet) of HDD locations.

HDD operations could take between 3 to 4 weeks each to complete and typically operate 24 hours per day. Projected noise levels from HDDs are normally about 88 dBA. Decibel level of 88 dBA ia a level where ear protection is not required as defined by OSHA rules and regulations. However, noise levels from HDD activities would be considered high for nighttime hours and would be considerably higher than the FERC requirements for full-time operations of construction activities. Consequently, it is recommended that prior to the start of construction, the following information should be filed at each HDD location: (a) the estimated number of days of drilling required at each location, and whether drilling would be done 24 hours per day; and (b) a description of any noise mitigation that would be implemented during drilling activity to reduce noise impacts at the NSAs below an L_{dn} of 55 dBA or 10 dBA over background if ambient levels are above an L_{dn} of 55 dBA.

It is anticipated that the noise generated by both onshore and offshore HDD operations would be less than that caused by ongoing large bulk carrier ships that traverse the shipping lanes in the same area of the planned HDD. Noise generated by the HDD operations would be above the water surface (either on land or on a fixed jack-up vessel) but would travel down the jack-up into the water. Noise travelling down the jack-up would quickly dissipate and would have a minimal effect on underwater noise. The noise from HDD operations, both onshore and offshore, is primarily from the diesel engines that power the drilling and pull-in winches. These operations have a relatively small footprint and in the past, noise abatement has been accomplished by encapsulating the equipment in temporary tents and canvas or constructing a sound absorption-barrier.

Construction of fixed components onshore near Port Manatee would include the construction of a new gas transmission pipeline, including two flowlines, the PLEM and piggable-Y, and HDD onshore; and a tie in to the Gulfstream LLC and TECO lines via a hot tap. This construction would occur at Port Manatee and along several roads in the area. There is an office building approximately 15 m (50 feet) from the proposed construction site. The employees would be exposed to noise levels of approximately 85 dBA from construction activities. The closest residential populations to the construction site would be approximately 122 m (400 feet) from the proposed route and would be exposed to noise levels of approximately 70 to 75 dBA. Construction operations on the pipeline would be limited to the hours of 7:00 a.m. to 9:00 p.m. to maintain compliance with local noise ordinances. Impacts from construction noise would be moderate, short-term, direct, and adverse.

Construction of the proposed pipeline and interconnection station would affect the local noise environment. The ambient sound level of a region is defined by the total noise generated within the

specific environment and is usually composed of sounds emanating from natural and artificial sources. At any location, both the magnitude and frequency of environmental noise can vary considerably over the course of a day and throughout the week. This variation is caused in part by changing weather conditions and the effect of seasonal vegetative cover.

Based on the evaluation criteria described previously, Port and pipeline construction would result in short-term, minor, direct, adverse impacts on the airborne noise environment. In response to Federal, state, and local requirements, BMPs have been included in project design or proposed by the Applicant to reduce environmental impacts (see **Section 4.11**).

Underwater Noise. Noise associated with the operation of machinery and increased vessel traffic during construction of the proposed Port Dolphin project could impact offshore biological resources. When underwater objects vibrate, they create sound-pressure waves that alternately compress and decompress the water as the sound waves travel, radiating sound waves in all directions away from the source. The impact that a man-made sound can have on sea life depends on its loudness, the acoustic frequency pattern at the location where the marine organisms detect the sound, the distance of the animal from the sound source, and the hearing sensitivity of the organism. Sound intensity decreases with distance from the noise source, with high-frequency components of noise decreasing more rapidly with distance than low-frequency components (Richardson et al. 1995). Additional noise impacts on biological resources are discussed further in **Section 4.2**.

During construction, underwater noise would be created by construction vessels (e.g., barges, tugboats, supply/service vessels) and machinery (e.g., pile-driving and pipe-laying equipment, trenching equipment) operating either intermittently or continuously throughout the area. Port construction would take approximately 6 months (weather contingent) from December through June. The third-octave band source levels for construction modeling scenarios over frequencies ranging from 10 through 2,000 Hz are presented in **Table 4.8-1**. Underwater noise would travel in all directions from the source. **Table 4.8-2** presents the distance (based on the radius of noise traveling in all directions) that the noise levels from construction equipment are expected to be heard. Pile driving would only occur offshore at the STL buoy locations, the other noises sources would occur both offshore and in Tampa Bay.

Vessel traffic associated with construction would be a relatively continuous noise source during that period. **Table 4.8-3** details the vessels that would be used during Port and pipeline construction, as well as their respective noise levels. Vessel noise, which is transmitted through air and water, would be created by propulsion machinery, thrusters, generators, and hull vibrations, and would vary with ship and engine size. Machinery noise from underwater construction would be transmitted through water and would vary in duration and intensity. Medium-sized support and supply vessels generate noise within frequencies between 20 Hz and 10 kHz with source levels between 130 and 160 dB re 1 μPa at 1 m (3 feet) (Richardson et al. 1995).

Sound propagation modeling was performed to predict the radii of noise impacts from construction and operational activities. The sound propagation model used several parameters, including expected water column sound speeds, bathymetry (water depth and shape of the ocean bottom), and bottom geoacoustic properties (how much noise is reflected off of the ocean bottom) to estimate the radii of noise impacts (JASCO 2008).

The proposed pipeline would be constructed within a half of a mile of the Terra Ceia AP, about 7 km (4.5 mi) from manatee critical habitat and about 18.5 km (11.5 mi) from a manatee protection area. As discussed in **Section 4.2**, noise from construction activities would produce noise levels above Level A or Level B harassment thresholds at varying distances (see **Tables 4.2-3** and **4.2-4**).

Table 4.8-1. Third-Octave Band Source Levels for Construction Modeling Scenarios

Freq (Hz)	Pile Driving[a]	Anchor Operations[b]	Pipe-laying[b]	Tug Anchor Pull[c]	Tug Half-Speed Transit[c]	Dredging[d]
	Source level (dB re µPa)					
10	202.0	175.6	164.7	202.8	188.7	153.0
12.5	202.0	170.0	166.2	196.5	182.7	153.0
16	192.0	162.7	162.7	193.1	174.1	153.0
20	187.0	158.3	165.5	191.1	167.5	153.0
25	184.0	151.8	169.0	196.7	165.2	165.0
31.5	186.0	149.1	159.6	188.8	172.2	162.0
40	188.0	146.6	156.2	177.3	182.2	169.0
50	184.0	147.9	157.7	176.4	170.2	172.0
63	188.0	153.3	154.3	179.2	167.1	171.0
80	198.0	153.2	152.2	178.8	164.9	172.0
100	200.0	156.4	153.0	178.1	161.8	179.0
125	204.0	162.2	159.8	176.7	166.0	178.0
160	208.0	155.6	152.5	175.9	167.6	180.0
200	209.5	151.4	149.8	173.5	167.5	179.0
250	209.0	151.7	152.2	178.8	164.8	177.0
315	204.0	143.6	142.4	172.8	165.2	177.0
400	204.5	145.2	147.2	165.4	165.2	176.0
500	205.0	145.8	144.8	170.7	169.8	173.0
630	198.0	145.5	142.7	168.8	159.9	170.0
800	195.0	150.5	147.5	165.1	158.6	169.0
1,000	194.0	150.8	148.7	164.2	163.6	169.0
1,250	195.0	142.7	141.7	167.3	161.0	169.0
1,600	194.0	138.6	136.1	165.9	164.9	169.0
2,000	192.0	143.2	139.3	166.5	164.2	169.0
Broadband	**216.2**	**177.2**	**173.9**	**205.2**	**190.8**	**187.7**

Notes:

a. Source levels for the impact hammer estimated assuming a pulse length of 100 milliseconds from an MHU 3000 impact hammer.

b. Source levels for anchor operations and pipelaying operations estimated based on the Castoro II barge.

c. Source levels for tug anchor pull and half speed transit are based on the Britoil 51 tug.

d. Source levels for dredging are based on the Aquarius dredge.

Table 4.8-2. Distances that 95 Percent of the Noise Associated with Construction Would Travel

Sound Pressure Level (dB re 1μPa)	Buoy Installation	Impact Hammering	Pipe-Laying: Offshore	Pipe-Laying: Inshore	Pipe-Laying: Passage Key, Live Boat
	Distance from Source (km)				
190	< 0.2	0.03	< 0.2	< 0.2	< 0.2
180	< 0.2	0.18	< 0.2	< 0.2	< 0.2
170	< 0.2	1.1	< 0.2	< 0.2	< 0.2
160	< 0.2	4.5	< 0.2	< 0.2	< 0.21
150	< 0.2	14.4	0.52	0.39	0.24
140	0.35	> 20	2	0.89	0.49
130	1.4	> 20	3.8	2.1	0.95
120	3.9	> 20	7.5	6	1.6

Table 4.8-3. Noise Emissions Sources During Construction

Operation	Auxiliary Equipment/ Comments	Engine Specifications	Assumptions
Offshore Facility (DWP)			
Anchor-Handling Support Vessels	ROV winches and hydraulic pumps, thrusters, sonar, survey equipment	Two 3,750-hp diesel engines	Operating for 24 hours/day for a period of 3.5 months at 100% load
Supply Boat	Bow thruster	671-hp diesel engine	
Crew Transfer Boat		671-hp diesel engine	
Tug		800-hp diesel engine	
Onshore Facility			
Hydraulic Excavator 330D	Caterpillar C9 ACERT	Two 268-hp diesel engines	Operating for a period of 50 days
Track-Type Tractor D7R	Caterpillar 3176C	One 240-hp diesel engine	Operating for a period of 50 days
Two-Ton Utility Truck	Ford F450 Diesel Power Stroke	One 350-hp diesel engine	Operating for a period of 50 days
One-Ton P/U Truck	Ford Power Stroke 6 Liter Diesel	Two 200-hp diesel engines	Operating for a period of 60 days
One-Ton Welding Trucks	Ford Power Stroke 6 Liter Diesel	Four 33-hp diesel engines	Operating for a period of 55 days

Operation	Auxiliary Equipment/ Comments	Engine Specifications	Assumptions
Onshore Facility (continued)			
Welding Machine 300 Amp.	Lincoln 300 Amp. Diesel	Four 33-hp diesel engines	Operating for a period of 55 days
Welding	Gas Metal Arc	E70S electrode	Hourly consumption as 20 lb/hour Annual consumption as 2,700 lb/year
Offshore Pipeline Facility			
Jackup: Port Manatee HDD Operation (Normal; Phase 1)	Diesel Engine	3,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/day and 27 days at 50% load
Spud Lay Barge: Shallow lay barge operation. Barge has no propulsion. Two tugs are used. (Normal; Phase 2)	Tug	1,200-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 59.4 days at 75% load
	Tug	1,200-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 59.4 days at 75% load
East Jackups. (Normal; Phase 2)	Jackup	3,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 27 days at 75% load
	Jackup	3,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 27 days at 75% load
West Jackups. (Normal; Phase 2)	Jackup	3,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 27 days at 75% load
	Jackup	3,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 27 days at 75% load
Pipelay Barge: Large lay barge pipeline operation. Barge has no propulsion. Uses two tugs. (Normal; Phase 3)	Tug	2,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 37 days at 85% load
	Tug	2,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 37 days at 85% load
Dragline Barge. (Normal; Phase 3)	Barge	600-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 6 days at 100% load

Operation	Auxiliary Equipment/ Comments	Engine Specifications	Assumptions
Offshore Pipeline Facility (continued)			
Plow Lay Barge: Plow burial of pipeline. Barge has no propulsion. Uses two tugs. (Normal; Phase 4)	Tug	2,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 113 days at 85% load
	Tug	2,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 113 days at 85% load
4-Pt DSVs for two supply vessels: Mattress armoring. (Normal; Phase 4)	Vessel	1,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 108 days at 100% load
	Vessel	1,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 108 days at 100% load
4-Pt DSVs for two supply vessels: Mattress armoring. (Downtime; Phase 4)	Vessel	1,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 12 days at 15% load
		1,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 12 days at 15% load
	Vessel	1,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 12 days at 15% load
		1,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 12 days at 15% load
Vessel: Gauge, fill, test, dewater and drying operations (Normal; Phase 5)	Vessel	300-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 13 days at 35% load
		300-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 13 days at 35% load
	Vessel	300-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 13 days at 35% load
		300-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 13 days at 35% load

Operation	Auxiliary Equipment/ Comments	Engine Specifications	Assumptions
Offshore Pipeline Facility (continued)			
Survey vessel (Normal; Not a particular phase)	Vessel	1,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 54 days at 50% load
	Vessel	1,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 54 days at 50% load
Jackup: Port Manatee HDD Operation (Downtime; Phase 1)	Jackup	3,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 3 days at 15% load
Spud Lay Barge: Shallow lay barge operation. Barge has no propulsion. Two tugs are used. (Downtime; Phase 2)	Tug	1,200-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 6.6 days at 15% load
	Tug	1,200-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 6.6 days at 15% load
East Jackups. (Downtime; Phase 2)	Jackup	2,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 3 days at 15% load
	Jackup	2,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 3 days at 15% load
West Jackups. (Downtime; Phase 2)	Jackup	2,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 3 days at 15% load
	Jackup	2,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 3 days at 15% load
Pipelay Barge: Large lay barge pipeline operation. Barge has no propulsion. Uses two tugs. (Downtime; Phase 3)	Tug	2,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 4 days at 15% load
	Tug	2,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 4 days at 15% load
Dragline Barge (Downtime; Phase 3)	Barge	600-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 1 day at 15% load
Plow Lay Barge: Plow burial of pipeline. Barge has no propulsion. Uses two tugs. (Downtime; Phase 4)	Tug	2,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 13 days at 15% load
	Tug	2,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 13 days at 15% load

Operation	Auxiliary Equipment/ Comments	Engine Specifications	Assumptions
Offshore Pipeline Facility (continued)			
4 Pt DSVs for two supply vessels: Mattress armoring. (Downtime; Phase 4)	Vessel	1,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 12 days at 15% load
		1,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 12 days at 15% load
	Vessel	1,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 12 days at 15% load
		1,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 12 days at 15% load
Vessel: Gauge, fill, test, dewater, and drying operations (Downtime; Phase 5)	Vessel	300-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 1 days at 15% load
		300-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 1 days at 15% load
	Vessel	300-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 1 days at 15% load
		300-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 1 days at 15% load
Survey Vessel. (Downtime; Not a particular phase)	Vessel	1,000-hp diesel engine using bunker C fuel oil with 0.05% sulfur content	Operating for 24 hours/ day and 6 days at 15% load

During the construction period, impact hammering would produce the loudest noise levels, but would likely occur for short periods of time. Noise from impact hammering would encompass a 4.5-km radius at 160 dB offshore and a 1.9-km radius inshore. 160 dB represents the Level B threshold for impulse/intermittent noise. Noise impacts from pipe laying and pipe burial are similar and would encompass a 7- to 9-km radius at 120 dB offshore and a 6- to 7-km radius at 120 dB inshore. For the Level A threshold, noise impacts from impact hammering offshore and pipe laying and burial would encompass an area less than 0.20 km. Impact hammering inshore would encompass a radius that is approximately 0.30 km at the Level A threshold. The radii of noise impacts vary depending on water depth because the transmission of lower-frequency sound waves can be significantly reduced in shallower water. As a result, the Level A and Level B radii in Passage Key are much shorter than the radii in Tampa Bay and offshore.

Although sounds created by construction equipment and vessels would be continuous during pipeline installation, activities would progress slowly along the route as the pipeline is laid and buried, and the

trench backfilled. Thus, any one area would be subject to the maximum sound levels for only a day or two each time as the construction activities pass that area.

Short-term, minor to major, direct, adverse impacts on the underwater noise environment would occur during Port and pipeline installation. BMPs and mitigation measures designed to limit impacts on marine life are discussed in **Section 4.11.** An additional mitigation method includes pipe laying during construction activities within a thin layer of sand. Through noise propagation modeling, it is estimated that a reduction in radii by 3 to 4 km could be obtained by adding a 2.5-m (8.2-foot) layer of sand during pipe-laying activities. This effect would be slightly more pronounced at the inshore sites where the water is shallower.

4.8.1.2 Operations

Under the proposed Project, long-term airborne and underwater noise impacts would be created by the operation of various equipment and powering systems on the SRVs and other support vessels and would be greatest in the immediate vicinity of the Port. Impacts of noise on biological resources are presented in **Section 4.2**.

Airborne noise. Vessels and equipment that would contribute to the airborne noise environment during routine deepwater port operations are presented in **Tables 4.8-3** and **4.8-4**. The major source of airborne noise would be from the vaporization of the LNG at the mooring buoy. Under the proposed Project, an overlap is anticipated between arriving and departing SRVs; consequently, an SRV would be present most of the time. Under the Proposed Action, the Port would operate 24 hours a day, 365 days per year to provide a continuous supply of natural gas. Noise levels in the offshore area would be elevated when two SRVs are on buoys (separated by a distance of approximately 3.1 miles) at the same time.

Table 4.8-4. Estimated Source Sound Levels from Equipment Used During Routine Operations on the Shuttle Regasification Vessel

Equipment	BHP	Sound Level in A-weighted Decibels [dBA]			
		1 m	1 km	5 km	Precautionary Zone Boundary
Air Compressor	125	98	38	24	36
Gas Compressor	1,200	108	48	34	46
BOG compressor	720	108	48	34	46
LNG tank pump	310	97	37	23	35
LNG send-out pump	2,060	97	37	23	35
Mobile Crane	N/A	109	49	35	47
Crane	274	108	48	34	46
Jib crane	550	105	45	31	43
Total (all equipment combined)		**115**	**55**	**41**	**53**

Source: USCG 2004

While SRVs are moored at the Port, main engines would not be operational, but shipboard machinery used to regasify or offload LNG, generate power, and maintain facilities, would produce continuous sources of noise. **Table 4.8-4** shows estimated equipment above-water sound levels using the dBA scale

at 1 m (3 feet), 1 km (0.6 mi), 5 km (3.1 mi), and at the boundary of the No Anchoring (Precautionary) Zone (1,500 m [4,921 feet]) from equipment that might operate on the SRVs. The 1-m (3-foot) sound levels represent the equipment source sound level without attenuation from any enclosure; the 1-km (0.6-mi) and 5-km (3.1-mi) sound levels reflect attenuation of sound over distance from the spreading of sound waves. The noise levels produced by the equipment would lessen as a result of transmission loss as noise moves through the SRV structure and from atmospheric attenuation. The data in **Table 4.8-4** indicates that there would be a minor noise impact outside the designated 1,500-m (4,921-foot) No Anchoring (Precautionary) Zone. Given the anticipated low noise contributions from the Proposed Action to onshore ambient noise levels, it is anticipated that noise impacts from Port operational activities would be short-term, minor, direct, and adverse.

Crew and supply boat radio transmitting operations would be of relatively short duration and conducted at a low power setting; therefore minor noise impact is expected. An additional noise source would come from SRV foghorns, which would generate warning signals at a sound level of 146 dBA (100 Hz) at 1 m (3.3 feet), as required by USCG regulation (33 CFR 67.10). This level is required for the foghorn to be audible at 3.22 km (2 mi). In addition, the device must sound a 2-second blast every 20 seconds during low-visibility conditions (less than 2-mi visibility). Foghorn operation would be intermittent and infrequent and at this distance would have no effect on onshore receptors. Routine operation noise impacts are expected to occur for the life of the project. The impact on existing noise levels is not expected to be readily discernable over the typical background noise level for oceans of 50 to 55 dBA at the No Anchoring (Precautionary) Zone boundary 1,500-m (4,921-foot) and beyond; therefore, routine operation noise impacts would be minor.

Foghorns installed on the SRVs would generate warning signals with a sound level of 146 dBA (100 Hz) at a 1.6-km (1-mi) distance that would be audible within a 3.2-km (2-mi) radius, as per USCG regulation 33 CFR 67.10. Foghorn operation would be infrequent and would create temporary noise level increases.

Noise levels from the other support vessels and transit carriers are estimated to range from 85 to 120 dBA at the source (USCG and MARAD 2006). The vessels and carriers would travel on established navigation routes, thereby passing specific receptors, and would not likely cause major long-term noise impacts onshore or offshore.

The Port would be constructed approximately 45 km (28 mi) from shore; consequently, noise generated by the vaporization process would not affect noise-sensitive areas onshore. Machinery noise generated during normal Port operation hours would vary in duration and intensity and would be similar to noise generated by fixed oil and gas structures, which range between 20 to 40 dBA above background levels and have a frequency spectrum of 30 to 300 Hz at a distance of 30 m (98.4 feet) from the source (MMS 2006). Support vessel trips would originate from existing facilities onshore and would follow established routes in nearshore waters, reducing noise effects. Noise generated from service vehicle traffic would be transient and particularly variable in intensity, depending on the source. Service vessels transmit mechanically based noise through both air and water, from propulsion and generator machinery, and from hull noise generated during transit.

Under the proposed Project, compression equipment would not be installed at the interconnection station. The Applicant has committed to installing equipment and components that would minimize the noise impact on the surrounding environment. Since onshore noise-sensitive areas are several miles away from the Port, there would be no discernible noise effects on onshore receptors (see **Table 4.8-2**). Although noise from Port operations could result in annoyance to recreational boaters and fisherman, the proposed Safety Zone would minimize the potential for recreational boaters and fishing vessels to operate in the immediate vicinity of the Port. Under the DWPA implementing regulations, the USCG is authorized to establish a permanent mandatory Safety Zone around deepwater ports whether a vessel is present or not.

The Safety Zone would extend approximately 850 m (2,789 feet) from the center of each buoy and encompass approximately 561 acres. All unauthorized vessels would be prohibited from anchoring or transiting the proposed Safety Zone at any time. The USCG would have the primary jurisdiction for the Safety Zone. Calculations indicate that at this distance, the expected noise level would be less than 53 dBA for equipment that might operate on typical SRVs. This noise level would not be readily discernable over a noise range of 50 to 55 dBA, which is the typical ocean background noise level.

In the event of an accident, emergency vessels and equipment would also cause short-term, minor to moderate, direct, adverse impacts. Monitoring of noise levels, and mitigation if noise levels are higher than anticipated, have both been requested by NMFS. Mitigation and monitoring procedures can be found in **Section 4.11.**

Based on the evaluation criteria described previously, long-term, minor, direct, adverse impacts on the airborne noise environment would occur during routine Port operations.

Underwater Noise. Sources of underwater noise from the Port operations include regasification and SRV operations. Underwater noise modeling was conducted for the SRVs for the offshore transit (full speed was assumed), buoy approach (half speed was assumed), and docking (three thrusters was assumed). However, it was later noted that a total of four thrusters could potentially be used. It was determined that the use of three thrusters rather than four thrusters would cause an increase of 1 or 2 dB re µPa and this difference would not be discernible due to ambient noise (Port Dolphin 2009b). Noise modeling indicates that overall, operational noise associated with the proposed Project is consistent with other man-made underwater noise sources in the area (e.g., commercial shipping, dredging). The third-octave band source levels for operational modeling scenarios are presented in **Table 4.8-5**. The distance that 95 percent of the SRV noise would attenuate, under different operational scenarios is presented in **Table 4.8-6**. An additional underwater noise source is the sound produced by the flow of gas through the proposed flowline, although very little noise in the underwater environment would be expected (JASCO 2008). **Table 4.8-7** provides an estimate of underwater or 1-octave band levels for regasification on one SRV. Noise modeling indicates that operational noise associated with the proposed Project is consistent with other man-made underwater noise sources in the area (e.g., commercial shipping, dredging). Long-term, minor to moderate, direct, adverse impacts on the underwater noise environment would occur during routine Port operations.

4.8.1.3 Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Table 4.8-5. Third-Octave Band Source Levels for Operational Modeling Scenarios (source depth is 6 m in all cases).

Frequency (Hz)	SRV, full speed transit	SRV, half speed transit	SRV, docking	SRV, docking, all 4 thrusters (not modeled)
10	171.0	162.4	171.5	172.7
12.5	171.0	162.4	171.5	172.7
16	171.0	162.4	171.5	172.7
20	171.0	162.4	171.5	172.7
25	171.0	162.4	171.5	172.7
31.5	171.0	162.4	171.5	172.7
40	171.0	162.4	171.5	172.7
50	171.0	162.4	171.5	172.7
63	171.0	162.4	171.5	172.7
80	171.0	162.4	171.5	172.7
100	171.0	162.4	171.5	172.7
125	169.1	160.5	169.6	170.7
160	167.0	158.4	167.4	168.6
200	165.0	156.4	165.5	166.7
250	163.1	154.5	163.6	164.7
315	161.1	152.5	161.6	162.7
400	159.0	150.4	159.5	160.6
500	157.1	148.5	157.5	158.7
630	155.1	146.5	155.5	156.7
800	153.0	144.4	153.5	154.6
1000	151.0	142.4	151.5	152.7
1250	149.1	140.5	149.6	150.7
1600	147.0	138.4	147.4	148.6
2000	145.0	136.4	145.5	146.7
Broadband	**182.1**	**173.5**	**182.6**	**183.7**

Source: Port Dolphin 2009b

Table 4.8-6. Distance That 95 Percent of the SRV Noise, Under Different Operational Scenarios, Would Travel

Sound Pressure Level (dB re µPa)	Transit	Buoy Approach	Docking
	Distance from Source (km)		
190	< 0.01	< 0.01	< 0.01
180	< 0.01	< 0.01	< 0.01
170	< 0.01	< 0.01	0.01
160	0.01	0.01	0.05
150	0.04	0.05	0.22
140	0.29	0.32	1.2
130	1.4	1.4	3.5
120	3.9	3.7	7.1

Source: Richardson et al. 1995

Table 4.8-7. Estimate of 1-Octave Band Levels for Regasification on One SRV

Center Frequency	Source Level (dB re 1 µPa 1m)
31.5	131.8
63	135.5
125	139.2
250	143.0
500	146.5
1,000	148.9
2,000	151.2
Broadband	164.6

Source: Richardson et al. 1995

It is expected that noise impacts from decommissioning would be limited to the immediate vicinity of the vessels and would be temporary and minor. Decommissioning of the Project would result in temporary noise due to diesel-powered vehicles, cranes, compressors, generators, and other miscellaneous tools. **Table 4.8-3** shows the typical vessels that would be used during port decommissioning, along with associated engine horsepower ratings and auxiliary equipment that might be expected during this 2.5-month process.

Demolition noise from decommissioning of the proposed pipeline could be heard by adjacent populations. Vehicle traffic associated with the decommissioning of the proposed pipeline would be similar to noise from vehicle traffic associated with construction. Noise impacts from vehicle traffic would only last the length of decommissioning operations. Demolition of the pipeline would not occur during decommissioning. Therefore, noise impacts from the pipeline decommissioning are only anticipated to be from vehicular transit along the pipeline, and are anticipated to be minor, short-term, direct, and adverse. Underwater noise levels from decommissioning would be similar to the levels from construction activities, as described in **Section 4.2**.

Short-term, minor, direct, adverse impacts on airborne noise receptors in the vicinity of the Port would occur during decommissioning. Noise generated by decommissioning vessels, machinery, and activities would create temporary, localized increases in both airborne and underwater noise levels. Impacts would be similar to those described in **Section 4.8**. No impacts on landside sensitive noise receptors would occur because decommissioning activities would occur far enough offshore that noise would attenuate to an imperceptible level before reaching onshore receptors. Potential noise impacts on biological resources are discussed in **Section 4.2.1**. Direct impacts on existing sound levels from decommissioning activities would mainly involve vessel engine operation noise. Mitigation measures for decommissioning activities would be similar to those used for construction activities, as described previously.

4.8.2 Alternatives

Table 4.8-8 compares impacts from the Proposed Action to each of the alternatives with respect to noise.

4.8.2.1 Southern Site and Route Alternative

Airborne and underwater noise impacts from the construction and operation of the Port at the Southern Site would be similar to the impacts discussed for the Proposed Site and Route. This alternative offers slight benefits to noise receptors as compared to the Proposed Action, which would be approximately 51.5 km (32 mi) from Port operations. Noise receptors closest to the pipeline would be the same distance from construction as under the Proposed Action.

Underwater noise levels would be similar to those described under the Proposed Action. In addition, since the onshore portion of the Southern Site and Route Alternative is similar to the route of the Proposed Action, the closest residence to the construction site would be the same, approximately 122 m (400 feet). Consequently, populations would be exposed to noise levels of approximately 70 to 75 dBA during construction activities.

The buoy array configuration and route for the Southern Site and Route Alternative would be similar to that of the Proposed Action. However, the length of the pipeline route would be about 12 percent longer (75.8 km [47.1 mi.]) than the Proposed Route (67.8 km [42.1 mi.]) from Port Manatee, so the construction period would be proportionally longer. Construction activity noise levels would not be louder in magnitude as compared to the Proposed Action. Noise impacts would be minor and cease at the end of the construction period.

4.8.2.2 Offshore Interconnection with Gulfstream Pipeline Alternative

Under this alternative, the construction period for the pipeline would be shorter. No noise impacts would be expected on populations onshore since airborne noise would be expected to diminish to negligible levels.

Underwater noise impacts associated with Port construction would be the same as under the Proposed Action. However, under this alternative, the pipeline would be shorter than under the Proposed Action by approximately 40 percent. Consequently, the underwater area that noise levels would impact would be about 40 percent less than under the Proposed Action

4.8.2.3 FSRU Port Design Alternative

Airborne and underwater noise impacts from operation of the Port under the FSRU Port Design Alternative would be similar to the impacts discussed for the Proposed Site and Route. Construction impacts would be less than under the Proposed Action. This alternative would result in less construction

noise from a reduction in facilities permanently attached to the seafloor. Both airborne and underwater noise impacts would be less than under the Proposed Action. Pile driver noise impacts would be expected to be reduced under this alternative because fewer anchors would be needed for the single FSRU mooring.

Airborne and underwater noise impacts from pipeline construction would be the same as under the Proposed Action.

4.8.2.4 AAV Vaporization Technology Alternative

Construction, operation, and decommissioning impacts under the AAV Vaporization Technology Alternative would be similar to those under the Proposed Action.

4.8.2.5 Suction Piles Anchoring Alternative

The installation of suction pile anchors would produce low levels (111 to 118 dB) of continuous underwater noise. Frequencies would range from low (12.5 Hz) to very high (2,000 Hz), and would be audible to marine mammals. This noise could cause marine mammals to temporarily avoid the construction area, but would not exceed NOAA's 120-dB criterion for continuous noise. Therefore, construction impacts under the Suction Piles Anchoring Alternative would be substantially less than those under the Proposed Action. Operation and decommissioning impacts under the Suction Piles Anchoring Alternative are expected to be similar to the Proposed Action.

4.8.2.6 No Action Alternative

The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, the additional infrastructure proposed by the Applicant would not be built and there would be no potential for noise impacts associated with the Project construction and operation. Means to satisfy the Nation's energy demands might result in increased use of existing land-based terminals, greater reliance on declining domestic oil and gas resources, or development of alternate means of importing LNG. Alternative sources of natural gas can include other Deepwater LNG Ports or onshore LNG terminals. Other Deepwater LNG Ports could have adverse noise impacts, but in different geographic locations. Onshore LNG terminals can be located in coastal areas where there would be greater likelihood of adverse noise impacts on humans and coastal resources.

Table 4.8-8. Summary of Impacts for Noise

Impacts	Proposed Action	Southern Site and Route Alternative	Offshore Interconnection Alternative	FSRU Design Alternative
Airborne noise from construction.	Short-term, minor, direct, adverse impacts.	Impacts would be equal to or less than those under the Proposed Action.	Impacts would be equal to or less than those under the Proposed Action.	Impacts would be equal to or less than those under the Proposed Action.
Underwater noise from construction.	Short-term, minor to major, direct, adverse impacts.	Impacts would be the same as those under the Proposed Action.	Impacts would be the same as those under the Proposed Action.	Impacts would be equal to or less than those under the Proposed Action.
Airborne noise from operation.	Long-term, minor, direct, adverse impacts.	Impacts would be equal to or less than those under the Proposed Action.	Impacts would be the same as those under the Proposed Action.	Impacts would be equal to or less than those under the Proposed Action.
Underwater noise from operation.	Long-term, minor to moderate, direct, adverse impacts.	Impacts would be the same as those under the Proposed Action.	Impacts would be the same as those under the Proposed Action.	Impacts would be equal to or less than those under the Proposed Action.
Airborne noise from decommissioning.	Short-term, minor, direct, adverse impacts.	Impacts would be equal to or less than those under the Proposed Action.	Impacts would be equal to or less than those under the Proposed Action.	Impacts would be equal to or less than those under the Proposed Action.
Underwater noise from decommissioning.	Short-term, minor to major, direct, adverse impacts.	Impacts would be the same as those under the Proposed Action.	Impacts would be the same as those under the Proposed Action.	Impacts would be equal to or less than those under the Proposed Action.

Notes:

There would be no impacts from the No Action Alternative.

The AAV Vaporization and Suction Pile Anchoring Alternatives were carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.9 Socioeconomic Resources and Environmental Justice

The following discussion of socioeconomic resources and environmental justice includes an analysis of impacts and a determination of impact duration and severity. Included in the discussion are elements of the project description that would both produce impacts and are proposed to minimize potential impacts. Applicant-proposed measures for minimizing potential environmental impacts are those that have been committed to by the Applicant and incorporated into the project design, and are listed in **Section 4.11**. If further measures are recommended by agencies to mitigate potential adverse impacts, they are stated at the end of each analysis and in **Section 4.11**. For analyses where no mitigation measures are stated, none have been identified to further reduce potential adverse impacts.

This section addresses the potential for direct and indirect impacts that the proposed activities would have on the local or regional economy (i.e., new business or loss of business that affects employment); employment; the procurement of goods and services; changes to population, housing, and infrastructure (e.g., schools, police, and fire services); and social conditions. Also evaluated are environmental justice concerns including disproportionately high and adverse human health or environmental impacts on low-income or minority populations. Adverse and beneficial impacts are designated as minor, moderate, or major based on the magnitude or intensity of the anticipated impacts.

Construction and operation of the Project would have long-term, minor, beneficial direct impacts on socioeconomic resources through increased employment and purchase of goods and services. Adverse impacts related to employment, population, housing, and public services would be minor and easily absorbed within the existing Tampa Bay-St. Petersburg regional resources and socioeconomic infrastructure. The onshore construction and support operations would be conducted at available existing facilities.

As described in the following sections, the Project impacts have been reviewed and determined that disproportionate impacts on low-income or minority populations or increased health and safety risks to children would not be expected. No substantial change to the local or regional economy, population, housing, infrastructure, or employment would be expected.

4.9.1 Impacts of the Proposed Action

4.9.1.1 Construction

Commercial and Recreational Fisheries. Commercial and recreational vessels, including those engaged in commercial fishing, would be temporarily excluded from the vicinity of construction activities for approximately 6 months during onsite construction along the pipeline route from Port Manatee to the STL buoys, from late-2010 through mid-2011, potentially resulting in minor space-use conflicts. Recreational fishing activity would also be temporarily excluded for the 6-month duration of Port construction. This would start around late 2010 and last until mid 2011 (Port Dolphin 2007f). During the 12 weeks of pipeline construction, fishing activity would also be temporarily excluded from a 500-m- (1,640-foot-) wide fishing exclusion zone centered on the pipeline route. Direct impacts on fisheries would occur in segments and would be localized to the immediate surrounding area. Following completion of each pipeline segment, the area would recover. Impacts on commercial fishing and the local fisheries resources from the Proposed Port and route construction would be short-term, minor, direct, and adverse. Adverse impacts would be short-term in nature.

The NMFS Fishing Statistics and Economics Division (SED) used data from 2006 to analyze the total number of commercial fishery landings off of the western coast of Florida (NMFS 2006b). They also analyzed the total number of commercial fishery landings for the Tampa-St. Petersburg area (NMFS

2007d). All commercial fishing vessels with a Federal permit for any federally regulated fishery are required to submit vehicle trip reports (VTRs) for every trip, whether the trip takes place in state territorial waters or in the EEZ. A fisheries model was created using the SED landing data and compared it to the total fishing area in the area of the proposed Port and pipeline route, to estimate future quantities and values of landings potentially lost due to the exclusion of commercial fishing activity. The landing totals for the western coast of Florida are shown in **Table 4.9-1**. The landing totals for Tampa Bay-St. Petersburg, proportional to the entire western coast of Florida, are shown in **Table 4.9-2**.

Table 4.9-1. Landings by Distance from U.S. Shores, 2006, State of Florida West Coast

Species	0–3 Miles		3–200 Miles		Total	
	Pounds (in thousands)	Dollars (in thousands)	Pounds (in thousands)	Dollars (in thousands)	Pounds (in thousands)	Dollars (in thousands)
Finfish Subtotals	16,004	$11,744	18,996	$42,245	34,999	$53,989
Shellfish Subtotals	21,340	$93,105	12,574	$46,929	33,914	$140,034
Totals	**37,344**	**$104,849**	**31,570**	**$89,174**	**68,913**	**$194,023**

Source: NMFS 2006b

Notes: * 0–3 miles are within state waters. 3–200 miles are within the EEZ.

Table 4.9-2. Tampa Bay-St. Petersburg Landings by Year, Compared to the State of Florida

Year	Finfish and Shellfish Fisheries (in pounds)	Dollars
Tampa Bay-St. Petersburg, total 2006	11,900,000	$27,600,000
State of Florida, total 2006	68,913,000	$194,023,000
Percent that Tampa-St. Petersburg composes Western Florida coast totals	17.3 percent	14.2 percent

Source: NMFS 2007g

When comparing the tables, Tampa Bay-St. Petersburg accounts for 17.3 percent of the total Western Florida fish landings in pounds and 14.2 percent in total dollars. When comparing the total area of the proposed Port and pipeline route to Tampa Bay-St. Petersburg as a whole, the construction area of the proposed Port and pipeline route makes up a small portion of the overall Tampa-St. Petersburg and GOM aquatic area. The total estimated offshore construction footprint is about 9,272 acres.

Conservative estimates place the square mileage of Tampa Bay (approximately 400 square miles) and the area of the GOM from which the finfish and shellfish data were compiled for **Table 4.9-2** at approximately 1,000 mi^2 (TBEP 2007). The areas that would be affected by the offshore construction, including all areas for the offshore port and the pipeline route, including all ROWs, would involve only 26.1 of those square miles, for a total of 2.6 percent of the area used by commercial fishermen caught. Assuming an even distribution of finfish and shellfish in this area, this comes out to an estimated 309,400 pounds of fish, or 2.6 percent of the 11,900,000 caught by commercial fishermen in Tampa Bay-St. Petersburg and the surrounding areas. The projected value of the impact on commercial fishing during construction is $591,760, or 2.6 percent of $27,600,000.

The estimate of losses to commercial fisheries does not take into account the relocation of commercial fishing. Figures of total catch, percent of total catch, and overall values are reasonably assumed to be overestimations, representing a maximum value based on ideal conditions and an even distribution of finfish and shellfish. Adverse impacts on fishing would be felt during the duration of the offshore construction phase, and would be distributed among the various commercial fishing businesses. This economic impact, when compared to the overall landings of Tampa-St. Petersburg and the western Florida coast as a whole, would be short-term, minor, direct, and adverse. The estimate for losses to commercial fisheries does not account for the potential for fishers to relocate their activities to other fishing grounds outside the offshore construction area. Rather, they assume that the exclusion of commercial fishing activity from the area would result in lost landing revenues to fishers that fish in the area, thereby reducing their net incomes.

Based on NMFS commercial fishing permit data, commercial fishers in the locations of the proposed Port and pipeline route would likely be displaced by project construction. Given the nearby locations of fishing areas suitable to these types of commercial fishing and preferred by the finfish and shellfish in question, displacement of fishers from the Port area would likely place the greatest pressure on areas to the north of the proposed Port and pipeline route. A suggested mitigation measure that would alleviate most direct adverse impacts on commercial and recreational fishing would be to relocate fishing activities to these surrounding areas. Fishing the areas around the affected area would be effective, since areas in the general vicinity would still be able to provide the species of finfish and shellfish that commercial fishers catch to ensure profitability. Shellfish and finfish that evacuate the construction area would relocate to these surrounding areas, and commercial and recreational fishers would still be able to secure landings similar to those that would have occurred on the proposed Port and pipeline route construction areas. Other possible mitigation measures to minimize impacts on commercial and recreational fishing would be to halt construction during peak fishing seasons. As the schedule currently stands, the construction of the proposed Port and pipeline route is scheduled to begin in late 2010 and continue for approximately 6 months, until mid 2011, therefore avoiding the peak recreational fishing effort in Tampa Bay. The estimated effect of these mitigation measures on the proposed Port and pipeline route would be to substantially decrease adverse impacts on commercial and recreational fishing. The decrease would reduce the expected impacts far below the maximum threshold of 2.6 percent presented previously.

There would be temporary, indirect noise and activity disturbance in the work area during installation of the Proposed Port and Pipeline Route. Potential impacts on commercially harvested fish would be temporary and minor, resulting in fish displacement followed by rapid recolonization (see **Section 4.2.1**). No mitigation is suggested for socioeconomic impacts associated with impacts on fish since the impacts would be negligible and short-term.

Marine Recreation and Tourism. Impacts associated with marine recreation and tourism would include temporary exclusion during the proposed Port and pipeline route construction, displacement of fish due to noise disturbance in the work area, and an increase in sediment loads during construction. The impacts would occur for the duration of construction, and the anticipated impacts would be short-term, minor, direct, and adverse.

As shown in **Table 3.9-5**, more than 52 percent and less than 5 percent of recreational fishing trips in the Tampa Bay area took place in inland waters and the EEZ, respectively. The potential for impacts with construction barges would most likely occur inside Tampa Bay, near Port Manatee and the area of the pipeline landfall. The extent of navigable waters within Tampa Bay itself is approximately 400 mi^2 (TBEP 2007). The size of a single construction barge, ranging in size from approximately 91.5 m (300 feet) to 99 m (350 feet), in comparison to all of Tampa Bay, is quite small. Yet these construction barges would block portions of Tampa Bay from being used for recreational fishing. Their noise could drive fish from local areas into deeper waters farther from shore. Therefore, impacts of construction

barges on recreational fishing vessels would be short-term, minor, direct, and adverse. Approximately 40 percent of the total recreational fishing trips in 2005 occurred from March through June (see **Table 3.9-6**). Direct and indirect adverse impacts on recreational fisheries from installation of the proposed Port and pipeline route would be similar to impacts on commercial fisheries.

Land-based Socioeconomic Conditions. Proposed Port and pipeline route construction would have direct and indirect positive impacts and economic benefits. Installation of the proposed Port and pipeline route would have direct and indirect, short-term, minor, and beneficial impacts on the economies of Manatee, Hillsborough, and Pinellas counties; other Florida counties; and other southeastern states due to increased employment and the purchase of goods and services. Approximately $23 million worth of goods and services would be required for construction, and these goods and services would be purchased from the local economy (Port Dolphin 2007f).

It is estimated that construction activities would temporarily employ 594 nonlocal workers, which would have a direct, beneficial impact on the local economy (Port Dolphin 2007f). Fifty-four nonlocal workers would be temporarily employed (i.e., 3 months) for onshore construction and approximately 540 nonlocal workers would be employed (i.e., 6 months) for offshore construction. However, the offshore construction workers would spend the majority of the time on the offshore vessels and only spend short periods of time onshore during crew changes and time off (Port Dolphin 2007f). Construction workers spending a portion of their wages locally for food, shelter, and entertainment would have a short-term, indirect, minor, and beneficial impact on the local economy. Other indirect, beneficial impacts would be noticed through the taxes generated by purchases, as well as payroll deductions.

In addition, it is estimated that approximately 82 local temporary jobs would be created during construction of the Port (Port Dolphin 2007f). Short-term, direct, minor, beneficial impacts on the local economy would be expected as a result of the creation of temporary employment. Since the economic impacts of construction would be positive, no mitigation measures are necessary.

Employment data for 2004 (see **Table 3.9-9**) show that there were 68,289 employees working in the construction industry within the ROI, out of a total of 562,111 workers employed in construction in Florida (Census Bureau 2000). The number of construction workers required for the proposed construction is relatively small compared to the available work force within the local region, and very small compared to the work force in the state. Each job created by Port and pipeline construction would generate additional jobs within the region, due to the many companies that supply goods and services to support construction activities. Indirect impacts from the proposed construction are expected to be short-term, minor, direct, and beneficial on local employment and the local economy; no long-term, beneficial, or adverse impacts on employment, population, personal income, or poverty levels, or other demographic or employment indicators are expected from construction.

Most Port and pipeline construction workers would be housed on the construction vessels during construction activities and remain offshore, except for crew changes when workers would return to their homes. Therefore, construction workers' reliance on local housing would be minor and expected to result in minor, short-term, direct, adverse impacts on the local housing market. If a large portion of the nonlocal construction workers are not housed on the construction vessels, construction could reduce the availability of housing, especially during the spring and summer, the peak seasons for tourism. In areas of seasonal tourism, nonlocal construction workers could displace tourists, which could be a concern for motel operators who depend on recurring business and could be reluctant to provide housing for construction workers. However, based on the large number of vacant housing units in the ROI (126,878 units), in 2000 (see **Table 3.9-11**), it is expected that ample housing would be available in the region. There would be no displacement of local citizens or tourists. The large number of vacant housing units would mitigate any adverse impacts.

Changes in economic factors also could impact the social fabric of a community. For example, increases in employment could stimulate the need for new housing units, and as a result, increase demand for community and social services such as primary and secondary education, fire and police protection, and health care. There would also be short-term minor adverse and beneficial impacts on public services from an increase in construction workers. A major temporary benefit would be increased employment in the local area. This would be a beneficial impact on the local tax base. Conversely, an influx of construction workers and their families would increase demand on existing public services, which might result in an overall adverse impact on public services. However, due to the large size of the work force and economy of the local region, the relatively small number of construction workers required for the proposed construction, and the temporary nature of the construction, no impacts on social conditions are anticipated. Since no impacts are anticipated, no mitigation measures would need to be implemented.

Environmental Justice. As discussed in **Section 3.9.2.2**, the ROI does not have disproportionately high minority or low-income populations compared to Florida. However, Hillsborough County does have disproportionately high percentages of minority residents compared to the state.

Guidance developed by the Interagency Federal Working Group on Environmental Justice recommends evaluating three criteria: (1) whether health or other environmental impacts of a project or alternative are above generally accepted norms (as measured by risks and rates), (2) whether the risk or rate of hazard or other environmental exposure appreciably exceeds or is likely to appreciably exceed those of the general population, and (3) whether health or other environmental impacts occur as a result of cumulative or multiple exposures. Analysis of potential impacts from the proposed Project show that construction of the proposed Port and pipeline route would not impose health or other environmental impacts above generally accepted norms, and would not impose hazards or exposures appreciably higher than those of the general population. Since construction of the proposed Port and pipeline route would have short-term, beneficial, minor, direct impacts on local employment, there would be no disproportionately high and adverse impacts on low-income or minority populations. Since no impacts on Environmental Justice would occur, no mitigation measures are necessary.

4.9.1.2 Operations

Commercial and Recreational Fisheries. Port operations would have long-term, minor, direct, adverse impacts on fisheries resources due to turbidity increases, noise, routine discharges, and direct losses from cooling water intake. These impacts are discussed in detail in **Sections 4.1.1.2** and **4.2.1.8**. No major reduction in populations of the commercially and recreationally important species available to the fishing industries is anticipated. Therefore, measurable secondary economic impacts, such as reduced employment in fishing or fishing-related industries, also are not anticipated. Long-term, minor, indirect, beneficial impacts on fisheries would occur from induced conservation associated with excluded fishing in the Safety Zone. Under the DWPA implementing regulations, the USCG is authorized to establish a permanent mandatory Safety Zone around deepwater ports whether a vessel is present or not. The Safety Zone would extend approximately 850 m (2,789 feet) from the center of each buoy and encompass approximately 561 acres. This is a result of maintaining 500 m (1,641 feet) from the moored LNGC (maximum of approximately 350 m [1,148 feet] length) as it weathervanes (rotates) around the buoy. All unauthorized vessels would be prohibited from anchoring or transiting the proposed Safety Zone at any time. The USCG would have the primary jurisdiction for the Safety Zone.

Pipeline inspection and maintenance would cause short-term, indirect, minor, adverse impacts on commercial fishing from noise and activity disturbance. Most species of demersal and pelagic fish would avoid maintenance areas. Potential impacts on commercial fishing would be short-term, indirect, minor, and adverse resulting in fish displacement followed by rapid recolonization. As the pipeline would be buried below the seafloor, the pipeline would not damage fishing gear (e.g., trawls, nets, and traps).

A mitigation measure that would alleviate most direct adverse impacts on commercial and recreational fishing would be for the fishers to relocate their fishing activities to surrounding areas. Areas in the general vicinity would still be able to provide the species of finfish and shellfish that commercial fishers seek.

Impacts on recreational fisheries would be similar to those on commercial fisheries, as described above, including impacts on fish populations and the prohibition of fishing in the Safety Zone. No major reduction in populations of the commercially and recreationally important species available to the fishing industries would be anticipated. Therefore, measurable secondary economic impacts, such as reduced charter operations, also are not anticipated. Because the Safety Zone would prohibit fishing within the vicinity of the Port, it is not anticipated that these potential localized impacts would have a measurable economic impact on the regional fishing industry. Relocating activities to surrounding areas would substantially reduce the impacts of reduced fishing charters and the loss of available recreational fishing areas as a result of the Safety Zone.

Impacts on shellfish would be negligible because the proposed facilities do not traverse any known commercial shellfish beds. The Port would cause permanent loss of approximately 22 acres of benthic substrata. The pipeline construction, including a 67-foot construction corridor, would occur over approximately 67 km (42 mi), resulting is a temporary loss of substrata. Permanent and temporary impacts would result is a loss of a fraction of fishing grounds within the western Florida coast (approximately 2.6 percent). The benthic substrata impacted by the offshore Port are typical for the western Florida coast and are not protected or unique. Since there would be no adverse impacts on shellfish populations, no mitigation measures are necessary.

Commercial Shipping. As shown in **Figure 2.1-14**, the proposed Port and pipeline route lie outside the Shipping Fairway, which is outlined in light red. Changes in traffic due to construction would be expected to occur. These changes are expected to occur for the duration of the operation of Port Dolphin. Impacts and mitigation with respect to commercial shipping are discussed in **Section 4.10.1**, Transportation.

Marine Recreation and Tourism. If a License is issued, the USCG may designate a mandatory NAA and recommendatory ATBA to further facilitate Port operations, safety, and security. The ATBA would encourage all vessels without a specific destination within the ATBA to operate outside the area. The USCG would also recommend vessels maintain a predictable course at a speed no greater than 10 knots while inside the ATBA. The NAA restrictions would extend beyond the buoy anchors with an approximately 1,000-m (3,280-foot) radius around each of the buoys. The ATBA would extend with an approximately 1,200-m (3,937-foot) radius around each of the buoys, and would include the area between the buoys. The Safety Zone, ATBA, and NAA for the Port are shown in **Figure 2.3-11**. Port operations likely would limit recreational activities within the ATBA/NAA. The Applicant would be encouraged to develop communications protocols with parties who have an interest in transiting the ATBA/NAA area such as fishing or recreational boating.

Impacts on fishing charter trips and aquatic recreational activities within the Safety Zone are expected to be minimal, adverse, and remedied by mitigation. No major reduction in populations of the commercially and recreationally important species available to the fishing industries is anticipated. Therefore, measurable secondary economic impacts, such as reduced charter operations, also are not anticipated. The mitigation measure of relocating activities to surrounding areas would substantially reduce the impacts of reduced fishing charters and the loss of available aquatic recreational areas as a result of the Safety Zone. Expected results would be similar to what had occurred previously in the Safety Zone.

Land-based Economic Conditions. Direct and indirect, long-term, minor, beneficial impacts would occur from operations of the Port throughout its projected lifespan of 25 years primarily due to the purchase of goods and services, and increased employment. The Port would employ 17 permanent workers, who would represent a minor percentage of the regional civilian labor force. Crew changes would take place at the Port, as well as at the LNG loading facility. The Applicant estimated that approximately $36 million worth of goods and services would be purchased for operations from the local economy throughout the life of the project (Port Dolphin 2007f).

There also would be short-term, minor, adverse, and beneficial, indirect impacts from the demand for housing for Port workers. Based on the relatively small number of Port workers and the large number of vacant housing units in the immediate region, it is expected that the induced regional demand for housing for Port workers would be minor and would be met by available supply. No overall adverse impact on public services would be anticipated, due to the large size of the work force and economy of the local region, and the relatively small number of Port workers.

Indirect, long-term, minor, adverse impacts could also occur from operations of the Port due to loss of revenue to commercial fisheries. Losses in revenue can be expected to affect other linked industries, such as suppliers and vendors, if excluding commercial fishing activities from the ATBA/NAA reduces landings. An analysis was undertaken to calculate the potential indirect costs of fishing exclusions to associated shoreside businesses. In the analysis, the loss of revenue projected by the analysis of the potential economic impacts of the fishery exclusion zones (see **Section 4.9**) was treated as a reduction in expenditures by the fishers to the fishing industry (North American Industrial Classification [NAIC] 11411). Any expected adverse impacts would be mitigated by relocating fishing activities to the areas surrounding the proposed Port and pipeline route. The measures are expected to mitigate any expected adverse impacts. Therefore, no adverse impacts would be expected as a result of lost revenue by commercial fisheries because of a lack of available areas for commercial landings.

Sand Resources. The Town of Longboat Key expressed concerns over the Port Dolphin pipeline route, asserting that the route and safety corridor initially proposed would lead to a substantial loss of sand resources. The town expressed concerns that future beach renourishment projects would either not be possible or would be more expensive and difficult because restrictions on dredging near the proposed pipeline would make large volumes of sand resources inaccessible to harvest, resulting in increased costs. Without these sand resources the Town of Longboat Key fears the tourism industry would diminish as the beaches recede. The town also stated that if beach renourishment activities were not continued, upland loss and damages to beach front properties could occur.

In response to the concerns expressed by the town, the Applicant revised the pipeline route to avoid permitted sand borrow areas. The sand resource locations and quantities of sand that would be inaccessible after construction of the pipeline are minimal and alternative resources exist nearby (see **Section 4.1.1)**. Therefore the proposed Port and pipeline route would have short- and long-term, indirect, minor, adverse impacts on sand resources and beach economies.

Environmental Justice. According to the Interagency Federal Working Group on Environmental Justice guidance, impacts from the operations of the proposed Port and pipeline route would not impose health or other environmental impacts above generally accepted norms, and would not impose hazards or exposures appreciably higher than those of the general population. Since operations of the proposed Port and pipeline route would have beneficial impacts on local employment, there would be no disproportionately high and adverse impacts on low-income or minority populations.

4.9.1.3 Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

Commercial Fisheries. The decommissioning of Port Dolphin would take an estimated 2 months to remove all offshore fixed components, excluding pipelines. During Project decommissioning, the ATBA/NAA would continue to be enforced, and commercial fishing would continue to be excluded from the vicinity of the Port. Vessel activity associated with pipeline decommissioning and the resulting fishing exclusions would occur near one or both ends of the pipeline.

Potential impacts on fisheries resources associated with the Port operations would terminate and return to ambient conditions upon the decommissioning of the facilities. Complete removal of all undersea, aboveground Port infrastructures would result in the loss of hard substrata habitat that might have developed over the life of Port operations. To minimize potential fisheries impacts associated with the decommissioning of the Port facilities; it would be possible to leave some of the facilities' underwater structure in place to function as an artificial reef. All decommissioning activities would be conducted in accordance with approved plans required by the licensing authority, and in compliance with all applicable and appropriate regulations and guidelines in place at the time of decommissioning. Necessary equipment and total trips for decommissioning are discussed in **Section 4.10**, Navigation and Transportation.

Any benefits to fisheries resulting from the fishing exclusions within the ATBA/NAA would be removed. The removal of the ATBA/NAA would reopen that area to marine recreation and tourism. This would cause a slight beneficial impact on commercial fishing. Since there is a beneficial impact, no mitigation measures would be necessary.

Land-based Socioeconomic Conditions. Proposed Port and pipeline route decommissioning would have both direct and indirect economic benefits, similar in character although smaller in scale compared to those that would result from Project construction. Construction workers spending a portion of their wages locally would have an indirect, short-term, beneficial impact on the local economy, and other indirect, beneficial impacts would be noticed through the taxes generated by purchases, as well as payroll deductions. Indirect impacts from the decommissioning activities are expected to be short-term and beneficial on local employment and the local economy. Potential short-term, indirect, adverse impacts from the demand for housing and public services would be expected to be minor.

Environmental Justice. No environmental justice impacts are expected as a result of decommissioning. Since decommissioning of the proposed Port and pipeline route would have beneficial impacts on local employment, there would be no disproportionately high and adverse impacts on low-income or minority populations.

4.9.2 Alternatives

Table 4.9-3 compares impacts from the Proposed Action to each of the alternatives with respect to socioeconomic resources.

4.9.2.1 Southern Location and Pipeline Route

Impacts on commercial fisheries, socioeconomics, and environmental justice from construction, operations, and decommissioning of the Southern Site and Route Alternative would be similar to those for the proposed Port and pipeline route. The Southern Route Alternative would be longer in overall length, therefore the duration and spatial extent would be greater than that of the proposed Port and pipeline route. With more construction, a slight beneficial increase in construction spending and employment would be expected.

4.9.2.2 Offshore Interconnection with the Gulfstream Pipeline Alternative

Impacts on commercial fisheries, and environmental justice from construction, operations, and decommissioning of the Offshore Interconnection with Gulfstream Pipeline Alternative would be similar to those compared to the Proposed Port and pipeline route. The Offshore Interconnection Alternative would be shorter in overall length (18.9 km [18 mi] as opposed to 67.6 km [42 mi]) than the Proposed Action. The duration and spatial extent would be less than that of the proposed Port and pipeline route. Less construction would mean less of an economic and employment impact in the ROI and surrounding areas since there would be far less construction and less labor would be needed.

4.9.2.3 FSRU Port Design Alternative

Impacts on commercial fisheries, socioeconomics, and environmental justice from construction, operations, and decommissioning of the FSRU Port Design Alternative would be similar to those compared to the Proposed Port and pipeline route. The FSRU Alternative would have a slight increase in beneficial impacts on economics and labor since an FSRU would have to be constructed, but the benefit would not be felt in the ROI and surrounding areas as the FSRU would be built off-site. The pipeline length would be unchanged, so similar beneficial economic impacts are expected for the FSRU Alternative when compared to the proposed Port and pipeline route.

4.9.2.4 AAV Vaporization Technology Alternative

Construction, operation, and decommissioning impacts under the AAV Vaporization Technology Alternative would be similar to those under the Proposed Action.

4.9.2.5 Suction Piles Anchoring Alternative

Construction, operation, and decommissioning impacts under the Suction Piles Anchoring Alternative would be similar to those under the Proposed Action.

4.9.2.6 No Action Alternative

The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under this alternative, the additional infrastructure proposed by the Applicant would not be built and there would be no potential for impacts on socioeconomic conditions associated with the project construction and operation. No jobs would be created in Florida from construction, operations, and decommissioning of the Port. Furthermore, coastal communities would not benefit from the increased revenues from the sales of goods and services to support the Port. Means to satisfy the Nation's energy demands might result in increased use of existing land-based terminals, greater reliance on declining domestic oil and gas resources, or development of alternate means of importing LNG. Alternative sources of natural gas can include other Deepwater LNG Ports or onshore LNG terminals. Use of fuel sources other than natural gas, would have the potential to cause adverse impacts on socioeconomic resources, both regionally and nationally, that could be less than, equal to, or greater than the impact of the Project depending on the nature of the alternative source.

Table 4.9-3. Summary of Impacts on Socioeconomics and Environmental Justice

Impacts	Proposed Action	Southern Site and Route Alternative	Offshore Interconnection Alternative	FSRU Design Alternative
Construction				
Commercial and Recreational Fishing	Short-term, minor, direct, and adverse. Adverse impacts would be short-term in nature and mitigated.	Similar to Proposed Action.	Similar to Proposed Action.	Similar to Proposed Action.

Impacts	Proposed Action	Southern Site and Route Alternative	Offshore Interconnection Alternative	FSRU Design Alternative
Construction (continued)				
Marine Recreation and Tourism	Would occur for the duration of construction; impacts would be short-term, minor, direct, adverse and mitigated.	Similar to Proposed Action.	Similar to Proposed Action.	Similar to Proposed Action.
Onshore Economic Conditions (Economic Benefits)	Direct and indirect positive impacts and economic benefits.	Slight beneficial increase in construction spending and employment.	Slight beneficial decrease.	Similar to Proposed Action.
Environmental Justice	No impacts are expected.	No impacts are expected.	No impacts are expected.	No impacts are expected.
Operations				
Commercial and Recreational Fishing	Long-term, minor, direct, adverse impacts.	Similar to Proposed Action.	Similar to Proposed Action.	Similar to Proposed Action.
Marine Recreation and Tourism	Minimal and adverse impacts.	Similar to Proposed Action.	Similar to Proposed Action.	Similar to Proposed Action.
Onshore Economic Conditions (Employment, construction spending)	Direct and indirect long-term minor beneficial impacts.	Similar to Proposed Action.	Similar to Proposed Action.	Similar to Proposed Action.
Environmental Justice	No impacts are expected.	No impacts are expected.	No impacts are expected.	No impacts are expected.
Decommissioning				
Commercial and Recreational Fishing	Slight beneficial impact.	Similar to Proposed Action.	Similar to Proposed Action.	Similar to Proposed Action.
Marine Recreation and Tourism	Slight beneficial impact.	Similar to Proposed Action.	Similar to Proposed Action.	Similar to Proposed Action.
Onshore Economic Conditions (Employment, construction spending)	Direct and indirect long-term minor beneficial impacts would occur (similar to construction).	Similar to Proposed Action.	Similar to Proposed Action.	Similar to Proposed Action.
Environmental Justice	No impacts are expected.	No impacts are expected.	No impacts are expected.	No impacts are expected.

Notes:

There would be no impacts from the No Action Alternative.

The AAV Vaporization and Suction Pile Anchoring Alternatives were carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.10 Navigation and Transportation

The following discussion of navigation includes an analysis of impacts and a determination of impact duration and severity. Included in the discussion are elements of the project description that would both produce impacts and are proposed to minimize potential impacts. Applicant-proposed measures for minimizing potential environmental impacts are those that have been committed to by the Applicant and incorporated into the project design, and are listed in **Section 4.11**. If further measures are recommended by agencies to mitigate potential adverse impacts, they are stated at the end of each analysis and in **Section 4.11**. For analyses where no mitigation measures are stated, none have been identified to further reduce potential adverse impacts.

This section addresses potential impacts on transportation and navigation associated with the project, potential alternatives, and the No Action Alternative. Impacts on transportation and navigation would occur if an action caused long-term interference with access to transportation routes, crowding of routes resulting in substantially increased risks of collisions, or other mishaps (e.g., grounding), or a substantial change over existing conditions. A minor adverse impact indicates vessel traffic could be somewhat affected, but no additional risk of crowding, collision, or mishaps is anticipated; moderate adverse impact indicates the additional traffic due to the Project might cause some increase in crowding and mitigation measures might be required to minimize the risk of mishaps; and major adverse impact indicates the project would result in a substantial change over existing conditions, causing a risk of mishap that would be difficult to mitigate.

4.10.1 Impacts of the Proposed Action

Factors associated with the Proposed Action that could affect navigation and transportation in the ROI include an increase in vessel traffic, establishment of Safety Zone and ATBA/NAA, and increases in roadway and railway traffic. The ROI for the Proposed Action includes the proposed offshore Project location (as shown on **Figure 2.3-1**), nearshore Project location (as shown on **Figure 2.3-2**), and the onshore Project location (as shown on **Figure 2.3-3**). Impacts associated with the alternatives to the Proposed Action are discussed in **Section 4.10.2**.

4.10.1.1 Construction

Offshore impacts

Vessel traffic. A variety of vessels are required for varying durations during construction of Port Dolphin and, therefore, a temporary increase in vessel traffic would be expected. Construction is anticipated to last for approximately 11 months and would move along the pipeline corridor. Construction is planned to begin in August 2010. A description of the activities that would take place during construction is provided in **Section 2.3.11**.

Construction activities would require a number of different types of vessels of various sizes. The duration that each vessel would be onsite would vary according to its role in construction activities. **Table 4.10-1** summarizes vessel traffic by vessel type and the number of trips along Egmont Channel to Port Manatee during construction activities. A Port vessel entering Tampa Bay via Egmont Channel, proceeding to Port Manatee, conducting its port business, and then exiting Tampa Bay via Egmont Channel would result in two vessel trips along Egmont Channel.

Many of the vessels required for construction would travel to the construction site and remain for several months, while others would make two trips (one round trip) along Egmont Channel to Port Manatee for a specific purpose. Survey vessels would generate two trips (one round trip) per day for 2 months (Port

Dolphin 2007k, Port Dolphin 2008a). Workers would travel from the offshore construction site to shore on weekly shifts; therefore, there would be one crew vessel round trip from the offshore construction site to Port Manatee per week (two trips per week). Offshore construction is anticipated to take place 24 hours a day, and shift changes would occur twice a day during off-peak hours at 12:00 p.m. and 12:00 a.m. (Port Dolphin 2008a). Only portions of the total 540 workers expected to be employed for offshore construction activities would come onshore at these weekly crew exchanges for time off (Port Dolphin 2007e).

Water barges would provide fresh water for slurry make-up used for HDD. There are three planned HDD crossings, therefore it is expected that the water barges would make 3 round trips (6 trips) along Egmont Channel during construction.

The increase in vessel traffic from construction activities along Egmont Channel would be moderate, but short-term. As shown in **Table 4.10-1**, 1,832 vessel trips along Egmont Channel would be expected. As shown in **Table 3.10-1**, there were 7,956 vessel trips along Egmont Channel to Port Manatee, Port of Tampa, and Port of St. Petersburg in FY 2008. It is expected that the construction of Port Dolphin would moderately increase the risk of crowding, collisions, or mishaps within Egmont Channel during the 11-month construction period.

Table 4.10-1. Port Dolphin Construction Vessels

Vessel Type	Number of Each Vessel Type Required	Approximate Size (m)	Trips per Year for Each Vessel Type (approximate)	Duration (approximate)
Survey vessel	1	46 x 24	120	2 months
Pipelaying/derrick barge	1	122 x 30	4	11 months (depending on weather)
Anchor handling support vessel	2	55	4	
Offshore tug	4	55	16	
Backfill barge	1	46 x 24	4	
Supply vessels	6	Various*	600	
Crew boats	1	24	80	
Bridge pull-in barge	1	76 x 13	4	
Material barges	5	61 x 12	900	
Jack-up barge	5	42 x 24	10	
Hopper barge	12	46 x 24	24	
Dragline barge	1	46 x 23	2	
Diving vessel spread	4	43 x 12	64	
Total	**44**	**--**	**1,832**	

Source: Port Dolphin 2007a, 2008a, and 2008f

Note: *Typical supply vessels would be 34 m and 56 m in length (3 each)

As discussed in **Section 3.10**, the vast majority of vessels in Tampa Bay are recreational vessels. The results of a Sea Grant survey (2004) indicated that approximately 66,874 pleasure boat trips were taken through Tampa Bay (Sidman et al. 2004). The Sea Grant survey also revealed that the overwhelming

majority of recreational vessels operate within a few miles of the coast, and are therefore not impacting vessel traffic in Egmont Channel. Based on the evaluation criteria presented in **Table 4.0-1**, the Port construction vessel traffic would represent a short-term, moderate, direct adverse impact on vessel traffic in Egmont Channel.

No mitigation and minimization measures are available that could remediate the short-term, moderate, direct adverse impact on vessel traffic along Egmont Channel as a result of Port construction vessel traffic.

Port calls. The 1,832 vessel trips along Egmont Channel shown in **Table 4.10-1** from Port construction vessels would be 916 calls to Port Manatee. Therefore, calls by Port construction vessels would more than double the number of calls to Port Manatee, where only 532 vessel calls were recorded in FY 2008 (see **Tables 3.10-1** and **4.10-1**). It is expected that an increase in vessel calls to Port Manatee would result in a moderate increase in the risk of mishaps and vessel crowding within the Port Manatee channel and Port Manatee's berthing space. As shown in **Table 3.10-3**, Port Manatee is busiest from August to October. As discussed in **Section 3.10.2.1**, Port Manatee is currently undergoing expansion, which when completed would include one-half mile of new deepwater berthing and modern docks and new navigational safety features including a 1,300-foot-diameter turning basin and improved turning configuration where the Port's channel intersects the main Tampa Bay Shipping Channel. Phase One of this expansion was completed in 2007 (MCPA 2009), and it is expected that the entire expansion would result in Port Manatee being able to handle additional vessel calls, resulting in minor impacts from vessel calls by the Project.

No mitigation and minimization measures are available that could remediate the short-term, minor, direct adverse impact on Port Manatee as a result of Port construction vessel traffic.

Construction Safety Zone. A construction Safety Zone would be established around the areas of active construction. The construction Safety Zone around the Port could be as much as 500 m (1,641 feet), resulting in a traffic-free area of approximately 48.5 acres (Port Dolphin 2007d). As construction and installation of the pipeline progresses, an associated construction Safety Zone would also move along the pipeline construction corridor as wide as 914 m (3,000 feet) and as long as 762 m (2,500 feet) (Port Dolphin 2008a).

Direct, adverse impacts would be expected from construction activities and the establishment of the construction Safety Zone during construction of the proposed Port. Movement of the construction Safety Zone along the offshore pipeline route could inconvenience recreational users who might be forced to navigate around these Safety Zones, but the size of the Safety Zone would not be cumbersome enough to prohibit recreational vessel movement in Tampa Bay. Commercial vessels would be less likely to be affected because the proposed construction corridor avoids major shipping fairways, including Egmont Channel, and only crosses the minor Gulf Intracoastal Waterway, which is west of the Port Manatee shipping channel at the entrance to Tampa Bay. The pipeline construction would not cross the shipping channel for Port Manatee. Enforcement of the construction Safety Zone could result in localized short-term, minor, direct, adverse impacts on vessel traffic in Tampa Bay. The potential for short-term, adverse impacts as a result of the construction Safety Zone would increase as the pipeline construction progresses further into Tampa Bay because that is where the vessel traffic is heaviest. Based on the evaluation criteria presented in **Table 4.0-1**, minor, direct, short-term, adverse impacts would be expected from offshore pipeline construction activities and the establishment of the construction Safety Zone during construction of the proposed Port.

Onshore impacts

Construction associated with the proposed Project could impact onshore traffic in multiple ways. First, materials and supplies would be delivered using existing onshore modes such as local roadways and possibly the CSX Railroad, which would increase vehicle traffic on those transportation routes. Second, construction workers commuting to and from construction sites would increase traffic on local roadways. Third, local traffic on the roadways that would be crossed during construction of the onshore pipeline would be slowed while construction is taking place.

Delivery of construction materials. During onshore construction, there would be almost constant traffic to and from the construction site. This traffic would include the transport of construction materials, supplies for crew members, and the exchange of crews.

It is anticipated that onshore construction activities would result in delivery of supplies and equipment via tractor trailer. These tractor trailers would travel regionally using I-10, I-4, and I-75 and would use U.S. Highway 41 to access Port Manatee (FDOT 2005). It is estimated that approximately 680 semi-truck trips would be required to deliver pipeline components and construction equipment and materials for the Port Manatee valve station and the Gulfstream/TECO interconnection station (Port Dolphin 2008a). Most deliveries would occur prior to the start of construction. Approximately 3.8 million vehicles annually use the portion of U.S. Highway 41 that provides access to Port Manatee from I-275, and 15 percent (556,000 vehicles) of this traffic is tractor trailer traffic. Approximately 1.1 million vehicles annually use Piney Point Road, which provides access to Port Manatee from U.S. Highway 41, and 13 percent (135,000 vehicles) of this traffic is tractor trailer traffic.

It is estimated that it would take approximately 60 days to construct the Port Manatee valve station and the Gulfstream/TECO interconnection station. Both facilities would be constructed simultaneously (Port Dolphin 2008a). The construction of the stations would involve the use of multiple types of construction trucks (e.g., an asphalt truck, aggregate truck, dump truck, welder's truck, and concrete truck) and construction equipment (e.g., a bulldozer, front-end loader, track hoe, and crane) (Port Dolphin 2008a).

Construction supplies could be delivered via barge or railway (Port Dolphin 2008a). Selection of the mode of transportation would depend on the location of the pipe mill and coating yard. Railway transport could be used for large, permanent gas handling equipment such as vessels, skids, and line pipe (Port Dolphin 2008a). It is not anticipated that the CSX railroad would be used to transport personnel (Port Dolphin 2008a).

Therefore, the proposed Project would have short-term, minor, direct, adverse impacts on the regional and local road network from delivery of construction equipment and materials. It is anticipated that the CSX Railroad would be able to accommodate any increased trips associated with the delivery of Project construction materials and would result in no adverse impacts on railway traffic.

No mitigation and minimization measures are available that could remediate the short-term, minor, direct, adverse impact on the regional and local road network from delivery of construction equipment and materials. However, delivery of construction materials via barge or railway would alleviate traffic on U.S. Highway 41 and at the Port Manatee access control center, reducing adverse impacts. No adverse impacts on railway traffic are expected as a result of the delivery of construction materials; therefore no mitigation and minimization measures are necessary.

Commuting workers. Workers would travel to and from the offshore construction site on weekly shifts. Only portions of the 540 workers would come onshore at the weekly crew exchanges for time off (Port Dolphin 2007e). Short-term, minor, direct, adverse impacts on vehicle traffic at Port Manatee and on the

regional roadways are expected from this small amount of workers coming onshore from the offshore construction site for time off.

Onshore pipeline construction activities are expected to employ 82 workers, but a peak average of 54 workers would be working on site at any given time (Port Dolphin 2007e). Construction of the Port Manatee valve station and the Gulfstream/TECO interconnection station is expected to employ 10 workers. Due to the existing transportation infrastructure in the Project area, an increase of 64 workers commuting to the onshore construction sites would have a short-term, minor, direct, adverse impact on transportation in the region.

No mitigation and minimization measures are available that could remediate the short-term, minor, direct adverse impact on the regional and local road network from workers coming onshore from the offshore construction site for time off, and workers commuting to the onshore construction sites.

Construction of the onshore pipeline. The onshore portion of the pipeline would extend from the Florida coastline at Port Manatee to the proposed interconnection station along Buckeye Road. Most construction, including the staging area and installation activities, is anticipated to take place within a 100-foot ROW centered on the pipeline route. Slick bore technology (uncased) would be used for certain road and other short distance crossings. These crossings include the crossing of U.S. Highway 41, Reeder Road, O'Neil Road, and Buckeye Road (Port Dolphin 2007b). A new county road, 31st Terrace East Road, would be constructed along the pipeline route. This road would also be crossed using slick bore technology (uncased) (Port Dolphin 2008f). The slick bore method of construction can require excavation of pits at either end of the proposed slick bore. Once excavated, a length of pipe would be installed by boring a horizontal hole under the highway or railroad track and pushing the pipe into the bored hole. The traffic on the roadways that would be crossed using slick bore technology would need to be slowed down while the construction is taking place. Construction is not anticipated to be conducted during peak traffic hours; therefore slowing of traffic represents a localized short-term, direct, minor, adverse impact on the traffic on the roadways that would be crossed by the onshore pipeline.

To minimize impacts on traffic, construction is not anticipated to be conducted during peak traffic hours. Florida Department of Transportation (FDOT) would also require specific work zone safety measures at the locations where pipeline construction would impact local vehicle traffic (FDOT 2008b) that could include a notice on its Web site under "current projects" to notify roadway users that this construction would be taking place, and road signs to notify vehicle drivers that their speed is about to be decreased. Flagmen might also be required to direct and slow traffic during construction activities that cross or are adjacent to roadways to ensure worker and driver safety.

The construction of the pipeline under the CSX Railroad is proposed to be accomplished via uncased dry jack and bore technology (Port Dolphin 2007b). Boring and jacking, or pipe jacking, is a method that utilizes a horizontal jack to install pipe in a single pass. This technology is commonly used when crossing roads, highways, railroads, waterways (in some instances), and other special crossings. It is anticipated that the crossing would take no more than 2 weeks to be completed, from start to finish (Port Dolphin 2008a). Port Dolphin would be required to get a permit for the railroad crossing from CSX. The permit would require specific plans for traffic controls and other safety measures as deemed appropriate by CSX.

No adverse impacts would be expected to the operations of the CSX Railroad; therefore, no mitigation or minimization measures are necessary.

4.10.1.2 Operations

Vessel traffic. During operations, the Project would result in at least one SRV being present offshore year round, and it is likely that two SRVs would be present (Port Dolphin 2007d). The SRVs would typically be connected to the buoy approximately 4 to 8 days, depending on the cargo-capacity and send-out rate of the LNG. The two separate buoys would allow natural gas to be delivered in a continuous flow, without interruption, by scheduling an overlap between arriving and departing SRVs (Port Dolphin 2007h). It is estimated that between 45 and 90 SRVs would use Port Dolphin annually with either 1 or 2 vessels present at any given time (Port Dolphin 2008a).

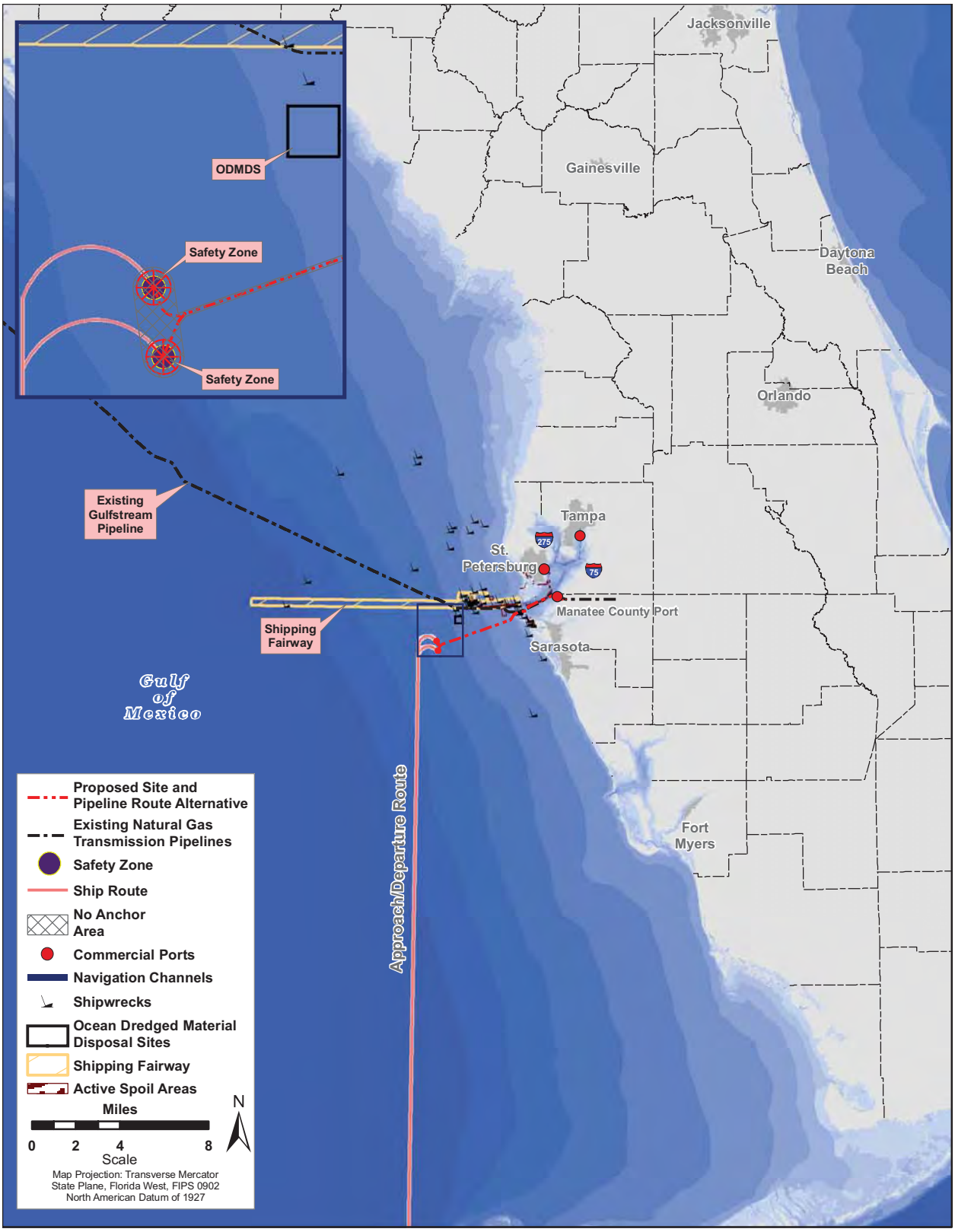
The SRVs would approach the terminal generally west until the SRV passes west of Key West. From this point, the course would change to generally north, roughly paralleling the west coast of Florida until reaching the general area of the terminal. Cruising speed of the SRV would be 19.5 knots; under normal conditions the average speed in the arrival zone would be less than about 14 knots (Port Dolphin 2008a). **Figure 4.10-1** shows the anticipated route SRVs would take in approaching the terminal. Once the LNGC is within 2 NM of the terminal, the captain would determine the best approach based on wind, current, and visibility. The SRVs would slow to a speed of less than 3 knots once inside the Safety Zone (Port Dolphin 2008a). Once the SRV has completely offloaded, it would travel out of the GOM with the shortest route west of Key West, always with a minimum 12 NM to the nearest shallow water. SRV approach and departure routes would avoid the existing shipping fairway, Egmont Channel (Port Dolphin 2008a).

Vessel traffic of Port operations was calculated by the number of times each vessel used Egmont Channel. Therefore, a Port vessel entering Tampa Bay via Egmont Channel, proceeding to Port Manatee, conducting its port business, and then exiting Tampa Bay via Egmont Channel would be two vessel trips along Egmont Channel. Buoy maintenance and inspection would occur once per year (2 trips), which would have a minor impact on vessel traffic. However, it is estimated that supply vessels would make 2 round trips to shore per week, which would result in 4 trips along Egmont Channel per week (208 trips per year). One crew vessel would make one round trip to shore per day, which would average 2 trips along Egmont Channel per day (720 trips per year) (Port Dolphin 2007d). This would result in a total of 928 trips along Egmont Channel per year for operation of the proposed Port.

Project operation vessel trips along Egmont Channel would result in long-term, minor, direct adverse impacts on vessel traffic along Egmont Channel (see **Table 3.10-1**). The operation of the Port is expected to require 928 vessel trips along Egmont Channel annually. In comparison, there were 7,956 vessel trips along Egmont Channel to Port Manatee, Port of Tampa, and Port of St. Petersburg in FY 2008. It is anticipated that an increase of 928 vessels trips annually along Egmont Channel for operation of the proposed Port would increase the risk of crowing, collision, or mishaps in the Egmont channel.

As discussed in **Section 3.10**, the vast majority of vessels in Tampa Bay are recreational vessels. The results of a Sea Grant survey (2004) indicated that approximately 66,874 pleasure boat trips were taken through Tampa Bay (Sidman et al. 2004). The Sea Grant survey also revealed that the overwhelming majority of recreational vessels operate within a few miles of the coast, and are therefore not impacting vessel traffic in Egmont Channel. Based on the evaluation criteria presented in **Table 4.0-1**, the Port operation vessel traffic would represent a short-term, minor, direct, adverse impact on vessel traffic in Egmont Channel.

No mitigation and minimization measures are available that could remediate the long-term, minor, direct adverse impact on vessel traffic along Egmont Channel as a result of Port operation vessel traffic.



Source of Ship Route, No Anchor Zone and Area to be Avoided: ConShelf 2007.

Figure 4.10-1. Typical SRV Approach Route to Port Dolphin

Port calls. The 928 vessel trips along Egmont Channel annually from Port operation vessels would be 464 calls to Port Manatee per year. Therefore, calls by Port operation vessels would increase the number of calls to Port Manatee, where only 532 vessel calls were recorded in FY 2008 (see **Tables 3.10-1** and **4.10-1**). It is expected that an increase in vessel calls to Port Manatee would result in a moderate increase in the risk of mishaps and vessel crowding within the Port Manatee channel and Port Manatee's berthing space. As discussed in **Section 3.10.2.1**, Port Manatee is currently undergoing expansion, which when completed would include one-half mile of new deepwater berthing and modern docks and new navigational safety features including a 1,300-foot-diameter turning basin and improved turning configuration where the Port's channel intersects the main Tampa Bay Shipping Channel. Phase One of this expansion was completed in 2007 (MCPA 2009), and it is expected that the entire expansion would result in Port Manatee being able to handle additional vessel calls, resulting in minor impacts from vessel calls by the Project.

No mitigation and minimization measures are available that could remediate the long-term, minor, direct adverse impact on Port Manatee as a result of Port operation vessel traffic.

Permanent Safety Zone and recommended ATBA/NAA. Under the DWPA implementing regulations, the USCG is authorized to establish a permanent mandatory Safety Zone around deepwater ports whether a vessel is present or not. The Safety Zone would extend approximately 850 m (2,789 feet) from the center of each buoy and encompass approximately 561 acres. This is a result of maintaining 500 m (1,641 feet) from the moored LNGC (maximum of approximately 350 m [1,148 feet] length) as it weathervanes (rotates) around the buoy. All unauthorized vessels would be prohibited from anchoring or transiting the proposed Safety Zone at any time. The USCG would have the primary jurisdiction for the Safety Zone.

If a License is issued, the USCG may designate a mandatory NAA and recommendatory ATBA to further facilitate Port operations, safety, and security. The NAA restrictions would extend beyond the buoy anchors with an approximately 1,000-m (3,280-foot) radius around each of the buoys. The ATBA would extend with an approximately 1,200-m (3,937-foot) radius around each of the buoys, and would include the area between the buoys. The Safety Zone, ATBA, and NAA for the Port are shown in **Figure 2.3-11**.

The establishment of a permanent Safety Zone, a mandatory NAA, and recommended ATBA to further facilitate Port operations, safety, and security during operations would have a direct adverse impact on marine transportation and navigation. The permanent mandatory Safety Zone around the Port would be in effect whether a vessel is present or not. The establishment of these areas would require vessels to alter their travel routes that previously included these areas, but due to the large area of navigable waters in Tampa Bay (210,467 acres) is it anticipated that locating an alternative route would not be an issue for these vessels (Port Dolphin 2007e). No adverse impacts would be expected on coastal or nearshore recreational or commercial fishing or shipping operations due to the establishment of the Safety Zone, NAA, or the ATBA. Based on the evaluation criteria presented in **Table 4.0-1**, long-term, minor, direct adverse impacts on vessel traffic would be expected from establishment of a permanent Safety Zone, a mandatory NAA, and recommended ATBA for Port operations.

No mitigation and minimization measures are available that could remediate the long-term, minor, direct, adverse impact on vessel traffic in Tampa Bay as a result of the establishment of a permanent Safety Zone, a mandatory NAA, and recommended ATBA for Port operations. No adverse impacts would be expected on coastal or nearshore recreational or commercial fishing or shipping operations due to the establishment of these areas; therefore, no mitigation or minimization measures are necessary.

Onshore impacts

Commuting workers. Operation of the Port would employ 17 permanent workers, who would represent a minor percentage of the regional civilian labor force (Port Dolphin 2007f). Crew changes would take place at the Port, as well as at the LNG loading facility. It is anticipated that these workers would come onshore via the dedicated crew vessel at regular intervals for time off. Due to the existing transportation infrastructure in the Project area, an increase of 17 workers commuting to Port Manatee to board the crew vessel would have no adverse impact on transportation in the region.

No adverse impacts would be expected on the regional and local road network as a result of the workers required for Port operation commuting to Port Manatee; therefore, no mitigation or minimization measures are necessary.

4.10.1.3 Decommissioning

Decommissioning would be expected 25 years after commencement of operations. It is expected that requirements for decommissioning and removal would have changed. The owner would be required to adhere to all applicable requirements of the appropriate Federal agencies at the time, and submit a decommissioning plan to the Secretary for approval.

The proposed decommissioning procedure for the buoys would be to remove each buoy, riser, and umbilical; and eight mooring lines. The landing pad would be removed as well. In the case of pile anchors, the anchors would be cut subsurface, with the top portion being removed and the lower portion remaining in place. Subject to negotiated land lease conditions, the proposed decommissioning of the offshore pipeline involves removing the PLEM and interfaces, flooding the existing pipe, sealing, and abandoning in place. Offshore pipelines would be filled with seawater and left in place. Pipelines would be marked as required by MMS. Onshore portions of the pipeline would be decommissioned through the FERC abandonment process in accordance with the FERC guidelines at the time the Applicant applies to decommission the onshore pipeline. Abandoned pipelines would be removed if necessary by a future project at the expense of that project sponsor. Impacts from pipeline removal would be included as part of the NEPA analysis required for that action.

The decommissioning of Port Dolphin would take an estimated 2 months to remove all offshore fixed components, excluding pipelines (Port Dolphin 2008a). The process of decommissioning the pipeline would only take a few months and would include cleaning and capping the pipeline and removing the buoy array and aboveground infrastructure. The impacts on navigation and transportation would be reassessed prior to decommissioning based upon environmental conditions and laws at that time.

Offshore impacts

Vessel traffic. Necessary equipment and total vessel trips for decommissioning are shown in **Table 4.10-2**. The DSV barge and offshore tug are only estimated to make two trips (one round trip) to shore during the entire decommissioning process. The crew/supply vessel is estimated to make two trips (one round trip) to shore per day. It is likely that a clearance zone would be established during the decommissioning process; however, the area would be limited to the STL buoy area and would not include the pipeline corridor.

It is expected that the increase in vessel traffic associated with decommissioning activities would be minor. Following completion of decommissioning, there would be no vessel traffic associated with Port Dolphin, which would be considered a beneficial impact. Based on the evaluation criteria presented in

Table 4.10-2. Port Dolphin Decommissioning Vessels

Vessel Type	Number of Vessels Required	Total Trips Required
DSV barge	1	2
Offshore tug	1	2
Crew/Supply vessels	1	150
Total	**3**	**154**

Source: Port Dolphin 2008a

Table 4.0-1, the Port decommissioning vessel traffic would represent a short-term, minor, direct, adverse impact on vessel traffic along Egmont Channel and at Port Manatee.

No mitigation and minimization measures are available that could remediate the short-term, minor, direct, adverse impact on vessel traffic along Egmont Channel and at Port Manatee as a result of Port decommissioning vessel traffic. Impacts on vessel traffic associated with the decommissioning process would be similar to those described above for the construction of the Port. Impacts are expected to be minor (Port Dolphin 2007d).

During decommissioning, safety clearances would be published in Notices to Mariners (Port Dolphin 2008a).

Onshore impacts

Removed offshore equipment would arrive at Port Manatee, and then be transported via truck for recycling, reuse, or disposal. Required equipment for removal of onshore components would include one 50-ton crane, two semi-trucks, two welding rig trucks, and three pickup or crew trucks (Port Dolphin 2008a).

The result of this analysis is that no adverse impacts would be expected on vehicle traffic as a result of the onshore equipment required for decommissioning purposes. It is anticipated that surrounding roads (i.e., U.S. 41, I-275, and I-75) would be able to accommodate the short-term, minor, direct increase in vehicles used for transporting removed offshore equipment.

No adverse impacts would be expected on vehicle traffic as a result of the onshore equipment required for decommissioning purposes; therefore, no mitigation or minimization measures are necessary. No mitigation and minimization measures are available that could remediate the short-term, minor, direct, adverse impact on vehicle traffic resulting from the transport of removed offshore equipment.

4.10.2 Alternatives

Table 4.10-3 compares impacts from the Proposed Action to each of the alternatives with respect to navigation and transportation.

4.10.2.1 Southern Site and Route Alternative

The Southern Site and Route Alternative components would be essentially the same as those discussed in **Section 4.10.1** for the Proposed Action. The offshore pipeline route would be 6.4 km (4 mi) greater under the Alternative, which is a 9 percent increase as compared to the Proposed Action. The

construction of the longer pipeline would likely result in more vessel traffic due to the increased time required to lay a longer length of pipe. The onshore portion of the Southern Route Alternative, which proceeds east of U.S. 41 and rejoins the Proposed Route when it turns east under U.S. 41, would be the same length and impact the same roadways as the Proposed Route. Therefore, the only difference between the Proposed Action and the Southern Site and Route Alternative is the 9 percent increase in the offshore pipeline length.

4.10.2.2 Offshore Interconnection with the Gulfstream Pipeline Alternative

The offshore pipeline route would be 38.8 km (24 mi) shorter under the Alternative, which is a 57 percent decrease as compared to the Proposed Action. This decreased length of pipe would result in less vessel traffic during construction activities due to the decreased time required to lay a shorter length of pipe. The elimination of the onshore portion of the pipeline associated with this alternative could result in a reduction of onshore impacts on navigation and transportation. Due to the shorter offshore pipeline length, less pipe and construction materials would be required. This could result in a smaller number of semi-trucks being required to move the construction materials, which could result in less vehicle traffic as compared to the Proposed Action. In addition, there would be no workers commuting to Port Manatee to construct the onshore pipeline, which would result in less impact on the regional roadway network as compared to the Proposed Action. The decrease in vessel traffic during construction activities and the elimination of the onshore portion of the pipeline associated with this alternative would result in less adverse impacts on navigation and transportation as compared to the Proposed Action.

4.10.2.3 FSRU Port Design Alternative

Under this alternative it is anticipated that the same number of LNGCs would be used as described under the Proposed Action. Impacts on navigation and transportation would be similar to the Proposed Action.

4.10.2.4 AAV Vaporization Technology Alternative

Construction, operation, and decommissioning impacts under the AAV Vaporization Technology Alternative would be similar to those under the Proposed Action.

4.10.2.5 Suction Piles Anchoring Alternative

Construction, operation, and decommissioning impacts under the Suction Piles Anchoring Alternative would be similar to those under the Proposed Action.

4.10.2.6 No Action Alternative

The No Action Alternative is considered to be the continuation of existing conditions of the affected environment without implementation of the Proposed Action. Under the No Action Alternative, the Maritime Administrator would deny the license, or the Governor of an adjacent coastal state would disapprove the Project under the Deepwater Port Act, or the applicant could withdraw the license application. Any of these actions or the disapproval of any other permitting agency could result in the Project not proceeding. This would mean that the proposed Port and the associated pipeline(s) would not be constructed. Accordingly, none of the potential environmental impacts, either positive or negative, associated with construction and operation of the proposed Project would occur.

Other license applications for projects designed to satisfy demand for natural gas might be submitted to the Maritime Administration or the FERC, and these projects, should they go forward, could have greater, lesser, or similar impacts in comparison with the Proposed Action. Other means might be used to satisfy

the nation's energy demands, such as expansion of existing ports or establishment of onshore LNG ports. Because the demand for energy in the United States is predicted to increase in the long term, consumers might have fewer and potentially more expensive options for obtaining natural gas in the near future. It is possible that existing natural gas infrastructure supplying the proposed market area could be enhanced in other ways unforeseen at this point, including further development of natural gas sources in North America and construction of associated pipeline projects. In some cases, potential customers of natural gas could select available energy alternatives such as oil, coal, nuclear, wind, solar, hydroelectric power, or biomass (e.g., wood or corn pellets) to compensate for the reduced availability of natural gas. In addition, a portion of the demand might be met through energy conservation. However, it is purely speculative to predict the resulting action(s) that would be taken by the potential end users of the natural gas proposed to be supplied by the Proposed Action and the associated direct and indirect environmental impacts of that use.

Under the No Action Alternative, there would be no direct or indirect adverse impacts on navigation and transportation. Means to satisfy the Nation's energy demands might result in increased use of existing land-based terminals, greater reliance on declining domestic oil and gas resources, or development of alternate means of importing LNG. Alternative sources of natural gas can include other Deepwater LNG Ports or onshore LNG terminals. Other Deepwater LNG Ports could have adverse impacts on navigation and transportation, but in a different geographic location.

Table 4.10-3. Navigation and Transportation Impacts Associated with the Alternatives, as Compared to the Proposed Action

Impacts	Proposed Action	Southern Site and Route Alternative	Offshore Interconnection Alternative	FSRU Design Alternative
Increase in vessel traffic during construction	1,832 total vessel trips	+ increase to estimated approx. 1,997 vessel trips	– reduction to estimated approx. 788 vessel trips	No change
Increase in vessel traffic during operation	928 vessel trips per year	No change	No change	No change
Safety Zone during construction	1. Size for Port: approx. 850 m (2,789 feet) 2. Size for pipeline: 200 m (656 feet) along the centerline of the pipeline	1. No change 2. – time	1. No change 2. time	No change
ATBA at Port during operation	1,200-m (3,937-foot) radius around each of the buoys	No change	No change	No change
Road and railway traffic during construction	1. 680 total semi-truck trips to deliver materials 2. Portions of 540 offshore workers coming onshore for time off 3. 64 workers commuting to onshore construction sites	1. + increase to estimated approx. 741 semi-truck trips 2. No change 3. No change	1. semi-truck trips 2. No change 3. 0	No change
Road and railway traffic during operation	17 workers	No change	No change	No change

Notes:

There would be no impacts from the No Action Alternative.

The AAV Vaporization and Suction Pile Anchoring Alternatives were carried forward but not presented in the table because there were no differences from the construction, operation, and decommissioning impacts of the Proposed Action.

4.11 BMPs, Mitigation and Minimization Measures, and Monitoring

NEPA, the Environmental Quality Improvement Act of 1970, as amended (42 U.S.C. 4371 et seq.), and 40 CFR 1508.20 Mitigation defines to include:

(a) Avoiding the impact altogether by not taking a certain action or parts of an action

(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation

(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment

(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action

(e) Compensating for the impact by replacing or providing substitute resources or environments.

In an EIS, mitigation measures must be considered for impacts that would not by themselves be considered significant but would contribute to lessen the environmental impact of the project overall.

4.11.1 Applicant-Proposed BMPs and Minimization Measures

The Applicant has identified the following BMPs and minimization measures for the construction and operation of the proposed Port, which are contained within the *Port Dolphin Energy LLC Deepwater Port License Application, Volume II, Appendix F,* as revised (Port Dolphin 2007e). The Applicant has committed to implementing these measures to comply with state and local requirements for permits, and to reduce potentially adverse environmental impacts if a license is issued for the proposed deepwater Port. The Applicant would also comply with Federal mitigation requirements.

Water Quality Impacts

1. Trenching and burial of the gas transmission pipeline would be performed using a pipeline plow to the maximum extent practicable. The towed plow trenching and burial technology was selected primarily because it does not fluidize bottom sediments. Therefore, it causes minimal impacts from sediment resuspension in comparison to other more conventional trenching and burial technologies (e.g., clamshell dredging).
2. Minimize the duration of construction to minimize impacts on marine resources by using the most efficient and effective construction equipment and methods available.
3. The use of turbidity curtains when installation is performed by clamshell dredge under the Skyway Bridge and during HDD. The use of turbidity curtains or other mitigation methods as practicable in OFW.
4. Filtered seawater would be used for the hydrotesting. An environmentally benign dye, Hydro Tag Green Fluorescent Dye, would be added to the flooding and test water. HydroHib P would be added to the water and would not be required to be treated prior to discharge. HydroHib P has been verified by the USEPA as demonstrated by NPDES permits.
5. Fresh water for the onshore pipe would be discharged on land using industry-standard filtering procedures prior to release.
6. No discharges would be made from the SRVs while at Port (i.e., bilge water, sanitary wastes, grey water, and ballast water).
7. Desalination freshwater-generation systems would be turned off while vessels are moored; therefore no chlorine or hypersaline wastewater would be discharged.

8. On the SRVs, gutter bars shall be placed around equipment where oil leaks could occur, (e.g., mooring winches, cranes). Rain water from these utility areas shall be drained to a bilge holding tank. No rain water from the utility areas would be discharged overboard while at the buoy.
9. Vessels would have secondary containment around hydrocarbon-containing equipment and systems as practicable.

Marine Mammal Vessel Strikes

Manatee Vessel Strike Mitigation Measures for active installation/decommissioning vessel operations:

1. Vessel operators and crews must maintain a vigilant watch for marine mammals and slow down or stop their vessels to avoid striking sighted protected species.
2. If a manatee is within 50 yards of a construction or support vessel underway, all operations would discontinue until it has left the vicinity of its own volition.
3. If a manatee is within 91 m (300 feet) of an active construction or support vessel underway, it would be observed and the vessel would proceed with caution, following the guidelines below:
   - Resume vessel at slow speeds
   - Stay on parallel course with manatee; follow behind, or next to, at an equal or lesser speed
   - Do not cross path of manatee
   - Do not attempt to steer or direct manatees away
   - Do not allow the vessel to come between a mother and her calf.
4. Practical speeds would be maintained to the extent possible when applicable. Guidelines for speeds include the following:
   - No wake/idle speeds when the draft of the vessel is less than 1.2 m (4 feet) from seafloor. All vessels would follow routes of deep water whenever possible.
   - All construction vessels transiting to and from the Port from shore would not exceed 10 knots, during regular operations.
   - Avoid sudden changes in speed and direction.
   - Speeds during installation would be well under 10 knots; vessel could be stationary during certain phases of installation.
   - Higher speeds would only be used if safety reasons warrant.
   - Reduce vessel speed to 10 knots or less when mother/calf pairs or large assemblages of manatees are observed near an underway vessel, when safety permits.
5. Members of the vessel crew would be encouraged to undergo fisheries training for observing mammals. Topics covered in the training course might include reporting procedures, collision emergency procedures, and marine mammal presence detection using a reference guide specific to the GOM species of marine mammals.
6. During installation and decommissioning, lookouts are required to scan for surfacing mammals and report sightings to the captain, who would notify the Environmental Coordinator.

7. Offshore construction activities would be temporarily terminated if manatees were observed in the area and there is the potential for harm of an individual. The Environmental Coordinator would be called in to determine the appropriate course of action.
8. During construction of the facility, an Environmental Coordinator would be on site and would be responsible for communicating with NOAA Fisheries Service and USFWS/FWC personnel, as appropriate.
9. If a collision seems likely, emergency collision procedures would be followed.
10. Vessel crews must report sightings of any injured, entangled, or dead protected species immediately, regardless of whether the injury or death is caused by your vessel. For marine mammals, notify the NMFS Southeast U.S. Marine Mammal Stranding Network Hotline telephone number: 877-433-8299. For sea turtles, notify the NMFS Southeast Regional Office at: 727-824-5312. Also notify the FWC Wildlife Alert hotline: 888-404-3922.

Whale Vessel Strikes

1. Vessel operators and crews must maintain a vigilant watch for marine mammals and slow down or stop their vessels to avoid striking sighted protected species.
2. When whales are sighted, maintain a distance of 100 yards or greater between the whale and the vessel.
3. When small cetaceans are sighted, attempt to maintain a distance of 50 yards or greater between the animal and the vessel whenever possible.
4. When cetaceans are sighted while a vessel is underway, attempt to remain parallel to the animal's course. Avoid excessive speed or abrupt changes in direction until the cetacean has left the area.
5. Reduce vessel speed to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel, when safety permits. A single cetacean at the surface can indicate the presence of submerged animals in the vicinity of the vessel; therefore, prudent precautionary measures should always be exercised.
6. Whales can surface in unpredictable locations or approach slowly moving vessels. When an animal is sighted in the vessel's path or in close proximity to a moving vessel, reduce speed and shift the engine to neutral. Do not engage the engines until the animals are clear of the area.
7. If a whale is within 100 yards of a construction or support vessel underway, all operations would cease until it is greater than 91 m (300 feet) from vessel. If the whale is within 91 m (300 feet) of an active construction or support vessel underway, it would be observed and the vessel would proceed with caution, following the guidelines below:
   - Resume vessel at slow speeds.
   - Stay on parallel course with whale, following behind, or next to, at an equal or lesser speed.
   - Do not cross path of whale.
   - Do not attempt to steer or direct whale away.
   - If a whale exhibits evasive or defensive behavior, stop the vessel until the whale has left the immediate area.
   - Do not allow the vessel to come between a mother and her calf.

8. Practical speeds would be maintained to the extent possible. Guidelines for speeds include the following:
   - No wake/idle speeds where the draft of the vessel provides less than a 4-foot clearance from the bottom. All vessels would follow routes of deep water whenever possible.
   - All construction vessels transiting to and from the Port from shore would not exceed 10 knots, during regular operations as most collisions causing lethal or severe injuries involve vessels moving at 10 knots or faster.
   - Avoid sudden changes in speed and direction.
   - Speeds during installation would be well under 10 knots; vessel could be stationary during certain phases of installation.
   - Higher speeds would only be used if safety reasons warrant.
9. Members of the vessel crew would be encouraged to undergo fisheries training prior to activity. Topics in the training course include reporting procedures, collision emergency procedures, and marine mammal presence detection (surfacing near wake).
10. During installation and decommissioning, lookouts would be required to scan for surfacing mammals and report sightings to the captain, who would notify the Environmental Coordinator.
11. Offshore construction activities would be temporarily terminated if whales or dolphins were observed in the area and there is the potential for harm of an individual. The Environmental Coordinator would be called in to determine the appropriate course of action.
12. During construction of the facility, an Environmental Coordinator would be on site and be responsible for communicating with NOAA Fisheries Service and USFWS/FWC personnel, as appropriate.
13. If a collision seems likely, emergency collision procedures would be followed.
14. Vessel crews must report sightings of any injured, entangled, or dead protected species immediately, regardless of whether the injury or death is caused by your vessel. For marine mammals, notify the NMFS Southeast U.S. Marine Mammal Stranding Network Hotline telephone number: 877-433-8299. For sea turtles, notify the NMFS Southeast Regional Office at: 727-824-5312. Also notify the FWC Wildlife Alert hotline: 888-404-3922.

Marine Mammal Acoustic Disturbances

Marine Mammal Acoustic Disturbance Mitigation Measures:

1. Anchors for the unloading buoys would be driven piles, which would occur over an approximately 2-week period. The use of enclosures and mufflers on equipment would be a viable option.
2. Vessel crew and contractors would be requested to use equipment and procedures that minimize noise. The use of enclosures and mufflers on equipment would be a viable option, as well as minimizing the use of thrusters.
3. All vessel crew members and contractors would be requested to “ramp-up” (also known as “soft start” or “slow build up”), which entails the gradual increase in intensity of a sound source. “Soft start” is a practiced mitigation measure used during pile driving (see recent NEPA documents and take permit authorizations) (MMS 2008, NMFS 2008) and seismic surveys (Weir and Dolman 2007, Abgrall et al. 2008). The intent of ramp-up is to either avoid or reduce the

potential for instantaneous hearing damage to an animal (from the sudden initiation of an acoustic source at full power) that might be located in close proximity. Increasing sound levels are designed to warn animals of pending operations, and to allow sufficient time for those animals to leave the immediate area.

4. To minimize excessive noise, engines on all equipment and vessels would be maintained in accordance with manufacturer's recommendations.
5. Sound-muffling devices or engine covers would be used where appropriate and engines and equipment would be turned off when not active during construction activities.

Marine Mammal Entanglement

Marine Mammal Entanglement Mitigation Measures to Prevent Entanglement in Anchor Lines or other Lines used in Project Area:

1. Any lines or other equipment that have the potential to become a source of entanglement for marine mammals would only be deployed as long as necessary to complete the construction or decommissioning task and would then be removed from the site.
2. Any lines or other equipment that have the potential to become a source of entanglement for marine mammals would be kept as taut as possible to prevent entanglement; however, a certain amount of slack is necessary to account for currents, tides, and other factors.
3. In the unlikely event that entanglement appears likely, the operator would remove the source as quickly as possible or take in the slack.
4. If temporary buoys need to be placed, materials such as heavy chains or cables would be used instead of material that could enable entanglement.
5. In the unlikely event a mammal becomes entangled, notify the NMFS Protected Resources or Sustainable Fisheries Division, Southeast Regional Office: 727-824-5312 or 727-824-5305, the FWC Wildlife Alert hotline: 888-404-3922, and the local authorized sea turtle stranding/rescue organization.

Marine Mammal Entanglement Mitigation Measures to Prevent Entanglement in or Ingestion of Marine Debris:

1. All vessel crew members and contractors would be responsible for ensuring that no debris would inadvertently enter the water, thus reducing the chance of entanglement and eliminating pollution to marine habitats.
2. Training courses on preventing marine debris would be provided for personnel working on the project. Methods for preventing accidental debris in the water include securing all materials, disposing of materials, and methods for recovering lost debris overboard. Training course material would be modeled by those developed by the Offshore Operators Committee.
3. Regulations state that no food or garbage would be discharged; all waste would be offloaded onshore for proper disposal.
4. No wildlife would be fed or attracted to the vessel, and no fishing would be allowed.

Sea Turtle and Smalltooth Sawfish Vessel Strikes

Sea Turtle and Smalltooth Sawfish Vessel Strike Mitigation Measures for active installation/ decommissioning vessel operations:

1. All personnel associated with the project shall be advised of the potential presence of sea turtles and smalltooth sawfish and the need to avoid collisions,
2. All vessel crew members and contractors would participate in a fisheries training for sea turtle and smalltooth sawfish presence and emergency procedures in the unlikely event a sea turtle or smalltooth sawfish is struck by a vessel.
3. All construction personnel are responsible for observing water-related activities for the presence of these species.
4. All construction personnel shall be advised that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the ESA.
5. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include the following:
   - Operation of any moving equipment closer than 15 m (50 feet) to a sea turtle or smalltooth sawfish shall cease.
   - Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 15-m (50-foot) radius of the equipment.
   - Activities may not resume until the protected species has departed the Project area of its own volition.
6. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a 4-foot clearance from the bottom. All vessels would preferentially follow deepwater routes (e.g., marked channels) whenever possible.
7. Lighting would be downshielded to prevent unnecessary upward illumination while illuminating the vessel decks only. Lights would not illuminate surrounding waters.
8. Lighting used during all operational activities would be regulated according to USCG requirements, without using excessive wattage or quality of lights.
9. Once an operational activity is completed, all lights used only for that activity would be extinguished.
10. During installation and decommissioning, lookouts are required to scan for surfacing turtles and report sightings to the captain, who would notify the Environmental Coordinator.
11. During construction of the facility, an Environmental Coordinator would be on site.
12. Any collision with or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the NMFS Protected Resources or Sustainable Fisheries Division, Southeast Regional Office: 727-824-5312 or 727-824-5305, the FWC Wildlife Alert hotline: 888-404-3922, and the local authorized sea turtle stranding/rescue organization.

Sea Turtle and Smalltooth Sawfish Entanglement

Sea Turtle and Smalltooth Sawfish Entanglement Mitigation Measures to Prevent Entanglement in Anchor Lines, other Lines used, or siltation barriers in Project Area:

1. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment.
2. Siltation barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the NMFS's Protected Resources Division, St. Petersburg, Florida.
3. Any lines or other equipment that have the potential to become a source of entanglement for sea turtles or smalltooth sawfish would only be deployed as long as necessary to complete the task and would then be removed from the site.
4. Any lines or other equipment that have the potential to become a source of entanglement for sea turtles or smalltooth sawfish would be kept as taut as possible to prevent entanglement; however, a certain amount of slack is necessary to account for currents, tides, and other factors.
5. If entanglement appears likely, the operator would remove the source as quickly as possible or take in the slack.
6. If temporary buoys need to be placed, materials such as heavy chains or cables would be used instead of void material that could enable entanglement.
7. Lines with mandated modifications, such as knotless and nonfloating material, would be used on construction vessels.
8. Any collision with or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the NMFS's Protected Resources Division (727-824- 5312), the FWC Law Enforcement (1-850-488-6251), and the local authorized sea turtle or smalltooth sawfish stranding/rescue organization, as appropriate.

Sea Turtle Entanglement Mitigation Measures to Prevent Entanglement in or Ingestion of Marine Debris:

1. All vessel crew members and contractors would be responsible for ensuring that no debris would inadvertently enter the water, thus reducing the chance of entanglement and eliminating pollution to marine habitats.
2. Training courses on preventing marine debris would be provided for personnel working on the project. Methods for preventing accidental debris in the water include securing all materials, disposing of materials, and recovering lost debris overboard. Training course material would be modeled by those developed by the Offshore Operators Committee.
3. Regulations state that no food or garbage would be discharged; all waste would be offloaded onshore for proper disposal.
4. No wildlife would be fed or attracted to the vessel and no fishing would be allowed.

Pelagic Bird Impacts

Pelagic Bird Impact Mitigation Measures: The following restrictions would be mandated on all vessels, except when USCG regulations or safety precautions supersede them:

1. Lighting used during all activities would be installed and utilized in accordance with NMFS and USFWS guidelines without using excessive wattage or quantity of lights to complete the activity.
2. Lighting would be downshielded to prevent unnecessary upward illumination, while directing the light to decks as needed.

3. Lighting would be turned off when not being used.
4. Plan vessel routes to avoid sensitive receptors (e.g., bird colonies) to the extent feasible.
5. Limit the number of vessel trips by using full-capacity crew boats as much as possible.
6. If a pelagic bird is injured, immediately notify the USFWS Division of Migratory Birds, Southeast Regional Division office (404-679-7189).

Benthic Habitat Impacts

1. Anchor locations were optimized to minimize impacts on benthic habitat. See discussion in **Section 4.2.1.6**.
2. Additional geophysical surveys have been performed in water depths of 14 to 20 m (45 to 65 feet) to look for reef gap. Unable to locate any for 3 NM north or 3 NM south of surveyed corridor.
3. Minimize duration of construction by using BMPs for installation.
4. Identify avoidance zones of critical habitat areas for placement of installation barge anchors.
5. Midline buoys would be utilized to the extent practicable on anchor chains to reduce the amount of anchor chain sweep.
6. During installation operations, vessel sizes would be selected to provide vessels adequate to perform the work, but minimized to reduce the number and type of anchors, where possible.
7. During detailed design, an anchoring plan would be developed that would provide procedures for anchor deployment to minimize impacts on hard- and live-bottom habitat.
8. A Mitigation Plan to compensate for unavoidable impacts on hard bottom would be developed during the permitting process.

Pelagic Habitat Impacts

1. The SRVs are closed systems, requiring no intake of water for heating LNG. However, a minimal amount of intake water would be required to cool generators. Discharge would be no greater than 10 °C above ambient temperature.
2. Thermal discharge of SRV cooling water meets USEPA criterion of less than or equal to 1.8 °F (1 °C) above ambient at edge of 100-m (328-foot) mixing zone.
3. No discharges would be made from the SRVs (i.e., bilge water, sanitary wastes, and grey water).
4. Desalination freshwater-generation systems would be turned off while vessels are moored, therefore no chlorine or hypersaline wastewater would be discharged.
5. Spill response plan and emergency response plans would be implemented.
6. The SRVs would include secondary containment around hydrocarbon-containing equipment and systems.
7. Utilization of BTA, a closed-loop system, would significantly reduce the loss of marine organisms. The innovative engineering design has resulted in operational aspects of the terminal that would provide for significant reductions of daily intake volumes compared to other conventional regasification processes presently proposed throughout the United States.

8. An intake rate of 9.5 MGD of seawater for engine-cooling purposes would substantially reduce the potential for entrainment of plankton individuals compared to open-loop vaporization systems, which can use five times more volume.
9. Limit seawater intake velocity to less than 0.15 m/s (0.5 feet/s) to ensure that older larval stages and juveniles would be able to avoid impingement or entrainment.
10. Use of pipeline plow to bury the pipeline to the extent practicable to reduce turbidity.
11. Vessels would have secondary containment around hydrocarbon-containing equipment and systems as practicable.
12. During the regasification operations, the vessel would not discharge any ballast water.
13. Spill response plan and emergency response plans would be implemented.
14. Vessels would be in compliance with MARPOL Annex I and Annex IV and USCG regulations.

Cultural Resources Impacts

1. All components would be placed to avoid potential significant targets by having a minimum of a 200-foot clearance.
2. All anchor chains would be located to avoid potential significant targets by having a minimum of a 200-foot clearance.
3. In the event of unanticipated discovery of cultural resources, Port Dolphin would follow an unanticipated discoveries plan, including stopping work as appropriate and notifying appropriate authorities.

Air Quality and Noise Impacts

1. Maintain engines on all equipment and vessels in accordance with recommended manufacturer operation and maintenance procedures.
2. Turn off machinery when not in use.
3. Construction equipment would be operated according to manufacturers' specifications to minimize noise effects, including proper use and operation of any sound-muffling devices or engine covers.
4. Change out of crews and delivery of supplies would follow normal vessel routes that avoid sensitive receptors. The number of trips would be limited by using full-capacity crew boats to the maximum extent possible.
5. The design of the project and operations meets USEPA's BACT requirements and complies with NAAQs.
6. Mufflers and shielding would be used where feasible.

Terrestrial Pipeline and Facilities Impacts

1. Use of HDD method under mangroves to avoid impacts.
2. Development of contingency plan for potential loss of drilling fluids.
3. Use of Environmental Coordinator onsite during installation of pipeline.
4. Implementation of project-specific Wetland and Waterbody Construction and Mitigation Plan.

5. Restoration of wetlands after construction, and replacement of in-kind wetlands in critical habitat areas.
6. Utilize BMPs and FERC's Upland Erosion Control, Revegetation and Maintenance Plan.
7. Use of existing ROWs, and minimize size of ROWs.
8. Use of areas at Port Manatee previously used for similar activities.
9. Regrade areas and revegetate.

Safety and Security Impacts

Potential security and safety impacts are minimized through vessel design criteria, which require certain safety and security features, including the following:

- Leak detection systems
- Double hull construction
- Tank construction and testing requirements
- Cargo tank instrumentation
- Structural analysis
- Isolation, construction, and testing requirements for piping and pressure vessels
- Emergency shutdown systems
- Pressure venting systems
- Vacuum protection systems
- Fire detection, prevention, and response systems.

Potential security and safety impacts also are minimized through operational procedures, including the following:

- Navigation procedures
- Spill response procedures
- Emergency response procedures
- Personnel training requirements
- Weather forecasting and information dissemination procedures
- Procedures and manning requirements for major evolutions
- Maintenance and service procedures
- Occupational, health, and safety training procedures
- Environmental monitoring programs
- Speed limits and operating hours
- Clearing procedures.

Potential security and safety impacts also are minimized through the imposition of restricted areas, such as the following:

- Safety Zone
- No Anchor (Precautionary) Zone
- Area to Be Avoided.

4.11.2 The Maritime Administration/USCG-Recommended Mitigation Measures

If issued, the Deepwater Port License would contain conditions requiring development and implementation of appropriate mitigation and monitoring measures. USCG would recommend the following measures for inclusion in the mitigation and monitoring plans, should a license be granted:

- Aboveground facilities adjacent to the ROW would be fenced and screened by existing and planted shrubs and trees to improve aesthetics.
- Fuel combustion sources would result in emissions of NO_x and CO, and, to a lesser extent, emissions of VOCs, SO_2, and particulate matter. During the vaporization process, the boilers would be fired by natural gas only. The boilers would be equipped with low NO_x burners and SCR to minimize emissions of NO_x, CO, and VOCs. Emissions of SO_2 and particulate matter from natural gas combustion would be minimal compared to the combustion of other fossil fuels because of the negligible sulfur and noncombustible content in natural gas. Potential annual emissions would be limited by a fuel use restriction.
- The power generation engines would supply electrical power for the vaporization process. Potential emissions are based on use of natural gas (greater than 99 percent) with a small amount (less than 1 percent) of diesel pilot fuel and an SCR and oxidation catalyst to control NO_x and CO/VOC emissions. SO_2 emissions would be limited by fuel use restrictions.
- Monitoring of the operation phase of the Port Dolphin project would focus on measuring the noise source levels of the LNGCs and the regasification process and on verifying the acoustic propagation models used to predict the sound fields generated by the project. This program would be conducted during the first year of project operation.
- The Maritime Administration agrees that mitigation and monitoring of egg, fish, and crustacean mortality should be required to demonstrate impacts consistent with those analyzed in the EIS. Further details of this effort, including the duration of monitoring, would be developed in coordination with NOAA and USEPA as part of a detailed monitoring and mitigation plan being developed by the Maritime Administration. Onsite sampling for ichthyoplankton, lobster, and shrimp densities should include 3 years of data prior to the start of operations. If a license is issued, Port Dolphin Energy LLC would be required to conduct site-specific, year-round surveying to collect data on existing fish and invertebrate ichthyoplankton populations. Data collection shall begin as soon as a license is issued, and continue for a minimum of 3 years. Furthermore, one year of data collection must be completed prior to the start of operations. Surveying shall be developed and coordinated with state and Federal natural resources agencies. If ichthyoplankton densities exceed levels specified in the monitoring plan, adaptive management of impacts would be required.
- If any roadways are damaged during onshore construction activities, such as using the slick bore method for installing pipeline under roadways, then the damaged roadway would be repaired to the preconstruction state.

4.11.3 FERC Recommended Mitigation and Monitoring Measures

If the FERC Commission authorizes the onshore pipeline portion of the Port Dolphin project, the FERC staff recommends that the following measures be included as specific conditions in the Commission's Order (Order). The FERC staff believes that these measures would further mitigate the environmental impacts associated with the construction and operation of the proposed Project. Mitigation measures

1 through 9 are standard conditions typically recommended by the FERC staff for pipeline projects. FERC staff recommendations 10 through 13 are project-specific.

1. Port Dolphin shall follow the construction procedures and mitigation measures described in its application and supplements (including responses to data requests) and as identified in the EIS, unless modified by the Order. Port Dolphin must do the following:
   a. Request any modification to these procedures, measures, or conditions in a filing with the Secretary of the Commission (Secretary)
   b. Justify each modification relative to site-specific conditions
   c. Explain how that modification provides an equal or greater level of environmental protection than the original measure
   d. Receive approval in writing from the FERC Director of the Office of Energy Projects (OEP) before using that modification.
2. The Director of OEP has delegated authority to take whatever steps are necessary to ensure the protection of all environmental resources during construction and operation of the project. This authority shall allow the following:
   a. The modification of conditions of the Order
   b. The design and implementation of any additional measures deemed necessary (including stop work authority) to ensure continued compliance with the intent of the environmental conditions, as well as the avoidance or mitigation of adverse environmental impacts resulting from project construction and operation.
3. Prior to any construction, Port Dolphin shall file an affirmative statement with the Secretary, certified by a senior company official, that all company personnel, environmental inspectors (EIs), and contractor personnel will be informed of the EI's authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs before becoming involved with construction and restoration activities.
4. The authorized facility locations shall be as shown in the EIS and as supplemented by filed alignment sheets. **As soon as they are available, and before the start of construction**, Port Dolphin shall file with the Secretary any revised detailed survey alignment maps/sheets at a scale not smaller than 1:6,000 with station positions for all facilities approved by the Order. All requests for modifications of environmental conditions of the Order or site-specific clearances must be written and must reference locations designated on these alignment maps/sheets.

   Port Dolphin's exercise of eminent domain authority granted under NGA section 7(h) in any condemnation proceedings related to the Order must be consistent with these authorized facilities and locations. Port Dolphin's right of eminent domain granted under NGA section 7(h) does not authorize it to increase the size of its natural gas pipeline to accommodate future needs or to acquire a ROW for a pipeline to transport a commodity other than natural gas.
5. Port Dolphin shall file with the Secretary detailed alignment maps/sheets and aerial photographs at a scale not smaller than 1:6,000 identifying all route realignments or facility relocations, and staging areas, pipe storage yards, and other areas that would be used or disturbed and have not been previously identified in filings with the Secretary. Approval for each of these areas must be explicitly requested in writing. For each area, the request must include a description of the existing land use/cover type, and documentation of landowner approval, whether any cultural resources or federally listed threatened or endangered species would be affected, and whether any other environmentally sensitive areas are within or abutting the area. All areas shall be

clearly identified on the maps, sheets, and aerial photographs. Each area must be approved in writing by the Director of OEP **before construction in or near that area**.

This requirement does not apply to extra workspace allowed by the *Upland Erosion Control, Revegetation, and Maintenance Plan,* minor field realignments per landowner needs, and requirements which do not affect other landowners or sensitive environmental areas such as wetlands. Examples of alterations requiring approval include all route realignments and facility location changes resulting from the following:

a. Implementation of cultural resources mitigation measures

b. Implementation of endangered, threatened, or special concern species mitigation measures

c. Recommendations by state regulatory authorities

d. Agreements with individual landowners that affect other landowners or could affect sensitive environmental areas.

6. **Within 60 days of the acceptance of this certificate and before the start of construction**, Port Dolphin shall file an initial Implementation Plan with the Secretary for review and written approval by the Director of OEP. Port Dolphin must file revisions to the plan as schedules change. The plan shall identify the following:

   a. How Port Dolphin will implement the construction procedures and mitigation measures described in its application and supplements (including responses to data requests), those identified in the EIS, and those required by the Order

   b. How Port Dolphin will incorporate these requirements into the contract bid documents, construction contracts (especially penalty clauses and specifications), and construction drawings so that the mitigation required at each site is clear to onsite construction and inspection personnel

   c. The number of EIs assigned per spread, and how the company will ensure that sufficient personnel are available to implement the environmental mitigation

   d. Company personnel, including EIs and contractors, who will receive copies of the appropriate material

   e. The training and instructions Port Dolphin will give to all personnel involved with construction and restoration (initial and refresher training as the project progresses and personnel change), with the opportunity for OEP staff to participate in the training session(s)

   f. The company personnel (if known) and specific portion of Port Dolphin's organization having responsibility for compliance

   g. The procedures (including use of contract penalties) Port Dolphin will follow if noncompliance occurs

   h. For each discrete facility, a Gantt or PERT chart (or similar project-scheduling diagram), and dates for

      i. the completion of all required surveys and reports

      ii. the mitigation training of onsite personnel

      iii. the start of construction

      iv. the start and completion of restoration.

7. Port Dolphin shall employ at least one EI per construction spread. The EI shall be:

a. Responsible for monitoring and ensuring compliance with all mitigation measures required by the Order and other grants, permits, certificates, or other authorizing documents

b. Responsible for evaluating the construction contractor's implementation of the environmental mitigation measures required in the contract (see condition 5 above) and any other authorizing document

c. Empowered to order correction of acts that violate the environmental conditions of the Order, and any other authorizing document

d. A full-time position, separate from all other activity inspectors

e. Responsible for documenting compliance with the environmental conditions of the Order, as well as any environmental conditions/permit requirements imposed by other Federal, state, or local agencies

f. Responsible for maintaining status reports.

8. Port Dolphin shall file updated status reports with the Secretary, prepared by the EI on a biweekly basis until all construction and restoration activities are complete. On request, these status reports will also be provided to other Federal and state agencies with permitting responsibilities. Status reports shall include the following:

a. The current construction status of the project, work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally sensitive areas

b. A listing of all problems encountered and each instance of noncompliance observed by the EIs during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other Federal, state, or local agencies)

c. Corrective actions implemented in response to all instances of noncompliance, and their cost

d. The effectiveness of all corrective actions implemented

e. A description of any landowner/resident complaints which might relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns

f. Copies of any correspondence received by Port Dolphin from other Federal, state, or local permitting agencies concerning instances of noncompliance.

9. Port Dolphin must receive written authorization from the Director of OEP **before commencing service of the project**. Such authorization will only be granted following a determination that rehabilitation and restoration of the ROW and other areas affected by the project are proceeding satisfactorily.

10. Port Dolphin shall not begin construction of the onshore portion of the project until it has filed documentation that all Section 7 consultations with the USFWS regarding the onshore portion of the project have been completed and Port Dolphin has received written notification from the Director of OEP that construction or use of mitigation may begin.

11. Prior to the start of construction, Port Dolphin shall file for each HDD location the following: (a) the estimated number of days of drilling required for each location, and whether drilling would be done 24 hours per day; and (b) a description of any noise mitigation which would be implemented during drilling activity to reduce noise impacts at the NSAs below 55 dBA L_{dn}, or 10 dBA over background if ambient levels are above 55 dBA L_{dn}.

12. Port Dolphin shall not begin construction and use of the onshore facilities and staging, storage, and temporary work areas until Port Dolphin consults the Florida SHPO regarding the need for survey of any newly identified pullouts, staging areas, extra workspaces, and pipe and contractor yards; files the SHPO's comments, any required survey report(s), and the SHPO's comments on the reports. All material filed with the Commission containing location, character, and ownership information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering as follows: **"CONTAINS PRIVILEGED INFORMATION--DO NOT RELEASE."**

4.11.4 NOAA/NMFS Recommended Mitigation and Monitoring Measures

In a scoping letter dated August 9, 2007, NMFS expressed concerns that the entrainment of marine organisms could affect the sustainability of marine and estuarine fisheries (see **Appendix C**). NMFS recommended that mitigative measures be developed and proposed to ensure that unavoided entrainment impacts are fully offset. The mitigation plan should be linked to a plan for adaptive management of the deepwater Port to identify and require operational or mechanical modifications to minimize adverse fishery impacts.

The NOAA/NMFS Southeast Region Habitat Conservation Division has developed the *Southeast Regional LNG Monitoring Plan Considerations* (Plan Considerations) (see **Appendix C**) for LNG terminal construction and operation in the GOM. Although the Plan Considerations were developed for open-loop regasification systems, two of the considerations (Questions 6 and 7 are represented as A and B) are applicable to the proposed Project.

A. LNG facilities must transport the regasified product to market through pipelines. These pipelines begin at the terminal and can tie-in with other natural gas pipelines located either offshore or onshore. Often, these pipelines are proposed to be considered on productive water bottoms or through wetlands, both of which could be designated as EFH supportive of marine fishery resources. If a pipeline impacts EFH, the NMFS recommends the habitat be restored after the pipeline has been constructed. Alternatively, NMFS might recommend a different pipeline route that would avoid or minimize impacts on EFH.

   Monitoring of the pipeline ROW is necessary to document pre-construction conditions as well as the level of successful restoration and the need for remedial actions. The following constitutes typical monitoring recommendations associated with the installation of pipelines in areas classified as EFH.

   1. The license should conduct a pre-construction survey of the pipeline ROW and all work areas to document pre-project conditions. The survey should include a GIS analysis using recent aerial photographs of the Project area with the pipeline ROW superimposed on the photograph and identify all habitat types using Cowardin codes (Cowardin et al. 1979) or other accepted measures. The survey also should identify elevations of all wetland areas crossed and include a description of major wetland vegetative communities, including seagrass beds. Where shell reefs could be impacted, the survey should document the geographic extent and productivity of those shell reefs.

   2. Ground photographs of those portions of the pipeline ROW which cross marsh should be taken prior to construction and immediately after construction. The photographs should be taken at 500-foot intervals from the center of the ROW with two photographs being taken at each location, one in each direction. GPS should be used during photography such that pre- and post-construction could be taken from the same locations.

3. Following one growing season after construction, the license should undertake a post-construction survey similar to that taken prior to construction. The intent of the post-construction survey is to identify areas where pre-construction contours were not successfully restored or where vegetative or shell reef communities did not become reestablished.
4. All monitoring information should be provided to the NMFS within 3 months of its development.

B. Reporting the Monitoring Result

1. Monitoring methodologies, sample locations, monitoring results and analysis, and any resulting recommendations for change of facility operations or monitoring protocols are to be prepared and submitted to the Federal licensing agency and the NMFS annually.
2. Annual reports are to be submitted by March 30 and would encompass the previous calendar year (or portion of a year if monitoring was not conducted for an entire 12-month period).

In a letter dated May 29, 2008, the Southeast Regional Office requested that the measures such as press in piles or pile sleeves be considered to reduce the noise impacts associated with pile driving.

NOAA/NMFS recommends that the Applicant develop a mitigation plan to compensate for unavoidable impacts on hard-bottom estuarine and marine habitats. The mitigation plan should include the following elements: (1) conceptual description of the overall mitigation plan; (2) quantification of anticipated hard-/live- bottom impact acreage versus proposed mitigation acreage and justification for the proposed mitigation acreage; (3) scientific criteria for determining mitigation success; (4) a project and mitigation implementation schedule; (5) targeted hard-/live- bottom climax communities expected in mitigation area(s), including their acreage and configurations; (6) materials and methods to be used to achieve the intended mitigation; (7) comprehensive 5-year monitoring and reporting schedules; and (8) contingency plans by which equivalent mitigation would be completed if the proposed mitigation fails.

During the Section 7 Endangered Species Act consultation process, NMFS submitted the following BMPs or harm avoidance measures for protected species to the USCG and MARAD. The following BMPs were considered for their effectiveness at reducing the potential for adverse effects on protected species (threatened and endangered species, and marine mammals). These measures are required to be implemented by Port Dolphin to avoid harm to ESA-listed species, as well as marine mammals protected under the MMPA, associated with the construction, operation, and decommissioning of the Port Dolphin Deepwater Port.

A. Pile-Driving Conditions

The following measures shall be required during any pile-driving activity associated with Port Dolphin.

1. All project personnel and contractor personnel shall be advised that there are civil and criminal penalties for harming or harassing protected species. Informational materials regarding protected species identification shall be provided to Project personnel.
2. For impact hammers, the power of the hammer shall be reduced to minimum energy levels required to drive a pile; thus, reducing the amount of noise produced in the marine environment. Additional measures shall be considered, when feasible, such as bubble curtains, Micarta© pile caps, and pile-driving sleeves.
3. A 250-m zone of influence (ZOI) shall be established around a pile to be monitored (a 200-m radius to the 160-dB isopleths and an additional 50-m watch zone). The Environmental Coordinator (EC) or at least one person designated as a Protected Species Observer (PSO) by the

EC shall monitor the 250-m ZOI to prevent or minimize potential adverse impacts on protected species.

4. Each PSO used shall be instructed in surveying for protected species, data recording, and be familiar with species that might occur in the area. A viewing platform, such as the highest point on a barge that has an unobstructed view in all directions, should be used to conduct effective observations. Each PSO shall be provided with the equipment necessary to conduct effective observations (e.g., a two-way radio dedicated to protected species communication, ear protection, polarized sunglasses, binoculars, and any necessary data recording equipment that might be required).
5. The 250-m ZOI around a pile shall be observed for protected species prior to beginning any pile driving. PSOs to protected species observations shall be used to visually monitor the impact zone for at least 45 minutes prior to beginning all pile-driving activities (each time a hammer is started).
6. Each time a pile-driving hammer is started, "dry firing" or "ramping up" of the hammer shall be conducted for at least 15 minutes to allow animals the opportunity to leave the area. Dry firing of a pile-driving hammer is a method of raising and dropping the hammer with no compression of the pistons, producing a lower-intensity sound than the full power of the hammer. Ramping up involves slowly increasing the power of the hammer and noise produced over the ramp-up period (and bubble curtains turned on if used).
7. The 45-minute observation period may occur during dry firing and ramping up of the pile-driving hammer (i.e., observations may begin 30 minutes prior to dry firing or ramp-up). Pile driving shall be stopped if any protected species are sighted within the 250-m impact zone, or a protected species is observed moving toward the ZOI. Pile driving shall not restart until the animal is confirmed to be outside of the impact zone. If at any time a protected species is observed in the safety zone during dry firing or ramp-up, the hammer shall be shut down until the animal has left the safety zone of its own volition; ramp-up procedures shall then be repeated.
8. Pile driving is expected to last at least 2 weeks. For pile-driving activities, the designated PSO shall intermittently scan the ZOI to watch for animals in the area (and to ensure bubble curtains are functioning properly if they are used). Any time an animal is observed in the impact zone during pile driving, all activities shall stop and the animal continually observed until it has left the area of its own volition.
9. Pile driving may continue into nighttime hours only if ramp-up/dry-firing protocols and visual clearing of the impact are conducted during daylight hours <u>and</u> bubble curtains are utilized.
10. Records shall be maintained of all protected species sightings in the area, including date and time, weather conditions, species identification, approximate distance from the pile, direction and heading in relation to the pile driving, and behavioral observations. When animals are observed in the impact zone, additional information and corrective actions taken such as a shutdown of the pile driver, duration of the shutdown, behavior of the animal, and time spent in the safety zone will be recorded. The PSOs shall also identify and record large schools of fish, marine mammals, *Sargassum*, jellyfish aggregations, or other indicators of biologically productive areas. Data shall be recorded on the types of piles driven (material construction, diameter and length of pile, wall thickness), the type and power of the hammer used, the number of cold starts, strikes per minute, and the duration of the pile-driving activities.
11. If a take of a listed species occurs, reinitiation of consultation is required. If a take of a listed species occurs from pile-driving activities, a report of the incident must be submitted by email to NMFS' Protected Resources Division at <u>takereport.nmfsser@noaa.gov</u>.

Please report all other dead or injured protected species to your local stranding network contacts. A list of sea turtle stranding responders is available at http://www.sefsc.noaa.gov/seaturtleSTSSN.jsp. A list of marine mammal stranding network responders for each state is available at http://www.nmfs.noaa.gov/pr/health/networks.htm or can be reported to the marine mammal stranding hotline at 877-433-8299.

All other dead or injured protected species incidents shall be reported to NMFS' Southeast Regional Office by telephone at 727-824-5312, or by fax at 727-824-5309.

B. Noise-Monitoring Study

Port Dolphin shall monitor noise levels during construction and operation of the LNG terminal to address uncertainties in the estimated noise levels, document propagation characteristics, and verify the impact zones estimated in the EIS. A noise-monitoring plan shall be submitted for review to NMFS, USCG, and MARAD for review prior to the start of pile-driving activities. A noise-monitoring report shall be submitted to NMFS, USCG, and MARAD detailing methods, noise levels measured during construction and operation of the terminal, verification of the noise levels predicted from construction and operation activities, and effectiveness of the noise-reduction methodologies utilized during construction. NMFS is available to assist with the development of the noise-monitoring plan and data collection protocols.

C. Construction Conditions

1. During construction of the facility, the EC must be on site.
2. Port Dolphin shall instruct all personnel associated with the project of the potential presence of protected species. Personnel associated with the project shall undergo a briefing of the potential presence of protected species in the project area and harm avoidance and any other mitigation requirements. All construction personnel are responsible for observing water-related activities for the presence of these species.
3. Personnel shall be informed that there are civil and criminal penalties for harming, harassing, or killing sea turtles and smalltooth sawfish protected under the ESA. The responsible party shall be held accountable for any protected species harmed, harassed, or killed as a result of construction activities.
4. During construction, lookouts are required to scan for protected species and report sightings to the EC.
5. If a protected species is seen within 100 yards of marine construction activities, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment within 100 yards of a protected species. Activities may not resume until the animal has departed the project area of its own volition.
6. In order to avoid causing injury or disturbance to protected species during activities associated with construction of the Port Dolphin, construction and support vessels shall follow the NMFS Vessel Strike Avoidance Measures and Reporting for Mariners (see below) during construction activities and when in transit between the terminal location and shore.
7. Use of HDD shall be used under mangroves to avoid impacts.
8. All vessel crew members and contractors shall participate in a fisheries training for protected species presence and emergency procedures in the unlikely event a protected species is struck by a vessel.
9. All construction personnel are responsible for observing water-related activities for the presence of protected species.

10. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a 4-foot clearance from the bottom. All vessels would preferentially follow deepwater routes (e.g., marked channels) whenever possible.
11. Lighting will be downshielded to prevent unnecessary upward illumination, while only illuminating the vessel decks. Lights will not illuminate surrounding waters. Lighting used during all operational activities would be regulated according to USCG requirements, without using excessive wattage or quantity of lights. Once an operational activity is completed, all lights used only for that activity would be extinguished.
12. If a dead or injured protected species is observed and is unrelated to the project, it will be reported, as requested, to the local stranding network contacts. The appropriate contact will be selected from either the current list of sea turtle stranding responders available at http://www.sefsc.noaa.gov/seaturtleSTSSN.jsp or the list of marine mammal stranding network responders available at http://www.nmfs.noaa.gov/pr/health/networks.htm. All other observed dead or injured protected species must be reported to the NMFS Southeast Regional Office by telephone at 727-824-5312 or by fax at 727-824-5309, or by email at takereport.nmfsser@noaa.gov if the death or injury was the result of Port Dolphin activities.

D. Vessel Strike Avoidance Measures and Reporting for Mariners

The NMFS has determined that collisions with vessels can injure or kill protected species (e.g., endangered and threatened species, and marine mammals). The following standard measures should be implemented to reduce to discountable levels the risk associated with vessel strikes or disturbance of these protected species. NMFS should be contacted to identify any additional conservation and recovery issues of concern, and to assist in the development of measures that might be necessary.

Protected Species Identification Training. Vessel crews should use an Atlantic and GOM reference guide that helps identify protected species that might be encountered in U.S. waters of the Atlantic Ocean, including the Caribbean Sea, and GOM. Additional training should be provided regarding information and resources available about Federal laws and regulations for protected species, ship strike information, critical habitat, migratory routes and seasonal abundance, and recent sightings of protected species.

Vessel Strike Avoidance. In order to avoid causing injury or death to marine mammals and sea turtles the following measures should be taken when consistent with safe navigation:

1. Vessel operators and crews shall maintain a vigilant watch for marine mammals and sea turtles to avoid striking sighted protected species.
2. When whales are sighted, maintain a distance of 100 yards or greater between the whale and the vessel.
3. When sea turtles or small cetaceans are sighted, attempt to maintain a distance of 50 yards or greater between the animal and the vessel whenever possible.
4. When small cetaceans are sighted while a vessel is underway (e.g., bow-riding), attempt to remain parallel to the animal's course. Avoid excessive speed or abrupt changes in direction until the cetacean has left the area.
5. Reduce vessel speed to 10 knots or less when mother/calf pairs, groups, or large assemblages of cetaceans are observed near an underway vessel, when safety permits. A single cetacean at the surface could indicate the presence of submerged animals in the vicinity; therefore, prudent

precautionary measures should always be exercised. The vessel shall attempt to route around the animals, maintaining a minimum distance of 100 yards whenever possible.

6. Whales might surface in unpredictable locations or approach slowly moving vessels. When an animal is sighted in the vessel's path or in close proximity to a moving vessel, and when safety permits, reduce speed and shift the engine to neutral. Do not engage the engines until the animals are clear of the area.

E. Additional Requirements for the North Atlantic Right Whale

1. If a sighted whale is believed to be a North Atlantic right whale, Federal regulation requires a minimum distance of 500 yards be maintained from the animal (50 CFR 224.103 (c)).
2. Vessels entering North Atlantic right whale critical habitat are required to report into the Mandatory Ship Reporting System.
3. Mariners shall check with various communication media for general information regarding avoiding ship strikes and specific information regarding North Atlantic right whale sighting locations. These include NOAA weather radio, USCG NAVTEX broadcasts, and Notices to Mariners. Commercial mariners calling on United States ports should view the most recent version of the NOAA/USCG produced training CD titled "A Prudent Mariner's Guide to Right Whale Protection" (contact the NMFS Southeast Region, Protected Resources Division for more information regarding the CD).
4. Injured, dead, or entangled right whales should be immediately reported to the USCG via VHF Channel 16.

F. Injured or Dead Protected Species Reporting

Vessel crews shall report sightings of any injured or dead protected species immediately, regardless of whether the injury or death is caused by your vessel.

Report marine mammals to the Southeast U.S. Stranding Hotline: 877-433-8299

Report sea turtles to the NMFS Southeast Regional Office: 727-824-5312

If the injury or death of a marine mammal was caused by a collision with your vessel, responsible parties shall remain available to assist the respective salvage and stranding network as needed. NMFS' Southeast Regional Office shall be immediately notified of the strike by email (takereport.nmfsser@noaa.gov) using the attached vessel strike reporting form.

For additional information, please contact the Protected Resources Division at:

NOAA Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701-5505
Tel: 727-824-5312
http://sero.nmfs.noaa.gov

G. Line and Cable Conditions

The following BMPs shall be followed to prevent entanglement in any lines or cables used, or siltation barriers used, in any construction area to avoid the potential for entanglement of protected species.

1. Siltation barriers shall not be made of any materials in which a protected species can become entangled (e.g., monofilament), shall be properly secured, and shall be regularly monitored to avoid protected species entrapment.
2. Siltation barriers may not block protected species entry or exit points from habitat without prior agreement from NMFS' Protected Resources Division, St. Petersburg, Florida.
3. Any lines or other equipment that have the potential to become a source of entanglement for sea turtles or smalltooth sawfish shall only be deployed as long as necessary to complete the task and then shall be removed from the site.
4. Any lines or other equipment that have the potential to become a source of entanglement for protected species shall be kept as taut as possible to prevent entanglement; however, a certain amount of slack is necessary to account for currents, tides, and other factors.
5. If entanglement appears likely, the operator shall remove the source as quickly as possible or take in the slack.
6. If temporary buoys need to be placed, materials such as heavy chains or cables shall be used instead of void material that could enable entanglement.
7. Lines with mandated modifications, such as knotless and nonfloating material, shall be used on construction vessels.
8. Any collision with or injury to a protected species must be reported immediately to NMFS' Protected Resources Division (727-824-5312), FWC Law Enforcement (850-488-6251), and the local authorized sea turtle or marine mammal stranding/rescue organization, as appropriate.

H. Marine Debris Reduction and Elimination Conditions

1. Marine debris training consistent with MMS NTL 2007-G03 Marine Trash and Debris Awareness and Elimination (http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2007NTLs/07-g03.pdf) is required for all personnel working on the project.
2. All vessel crew members and contractors are responsible for ensuring that no debris inadvertently enters the water, thus reducing the chances of entanglement and eliminating pollution to marine habitats.
3. Discharge or disposal of garbage and other solid debris from vessels shall be prohibited, consistent with MMS (30 CFR 250.300) and the USCG. Discharge of plastics shall be strictly prohibited and shall never be authorized; this includes ashes from burned plastics. All plastics shall be returned to shore and shall be tracked. No food or garbage shall be discharged; all waste shall be offloaded onshore for proper disposal.
4. No wildlife shall be fed or purposely attracted to the vessel and no fishing is allowed.
5. A waste management plan shall be developed and implemented as part of the port operations manual.

I. Water Quality Conditions

1. Trenching and burial of the gas transmission pipeline shall be performed using a pipeline plow, to the maximum extent practicable. The towed plow trenching and burial technology was selected primarily because it does not fluidize bottom sediments. Therefore, it causes minimal impacts from sediment resuspension in comparison to other more conventional trenching and burial technologies (e.g., clamshell dredging).
2. The duration of construction shall be minimized to minimize impacts on marine resources by using the most efficient and effective construction equipment and methods available.
3. Turbidity curtains or other methods to reduce turbidity shall be used for pipeline installation under the Skyway Bridge, in Outstanding Florida Waters, and during HDD.
4. Filtered seawater shall be used for the hydrotesting. An environmentally benign dye would be added to the flooding and test water. A biocide, oxygen scavengers, and a corrosion inhibitor would be added to the water; however, the water would be treated prior to discharge.
5. Hydrostatic test water for the offshore pipe will be discharged in offshore waters.
6. Fresh water for the onshore pipe will be discharged on land using industry-standard filtering procedures prior to release.
7. The gasification system on the SRVs is a closed system, requiring no intake of water for vaporizing LNG. To cool generators, 9.5 MGD of intake water will be required. Discharge will be no greater than 50 °F (10 °C) above ambient temperature.
8. Thermal discharge of SRV cooling water shall meet USEPA's criterion of less than or equal to 1.8 °F (1 °C) above ambient at the edge of the 100-m mixing zone.
9. No discharges shall be made from the SRVs (i.e., bilge water, sanitary wastes, grey water).
10. Desalination freshwater-generation systems shall be turned off while vessels are moored; therefore, no chlorine or hypersaline wastewater would be discharged.
11. On the SRVs, gutter bars shall be placed around equipment where oil leaks could occur, (e.g., mooring winches, cranes). Rain water from these utility areas shall be drained to a bilge holding tank. No rain water from the utility areas shall be discharged overboard while at the buoy.
12. During the regasification operation, the SRVs shall not discharge any ballast water.
13. Spill response plan and emergency response plans shall be implemented.
14. Vessels shall be in compliance with MARPOL Annex I, Annex IV, and USCG regulations.

4.11.5 USFWS Recommended Mitigation and Monitoring Measures

1. The service recommends that a light management plan be implemented during the construction phase of the Port Dolphin LLC liquefied natural gas deepwater port. The service requests to review this plan prior to the commencement of this project.
2. The development of an Eastern indigo snake protection/education plan for all construction personnel to follow. The plan would be provided to the USFWS for review and approval at least 30 days prior to any clearing activities. Informational signs should be posted throughout the construction site to contain the following information:
   - Description of the Eastern indigo snake, its habits, and protection under Federal Law
   - Instructions not to injure, harm, harass, or kill this species

- Directions to cease clearing activities and allow the Eastern indigo snake sufficient time to move away from the site on its own before resuming clearing
- Telephone numbers of pertinent agencies to be contacted if a dead Eastern indigo snake is encountered. The dead specimen should be thoroughly soaked in water, and then frozen.

3. If not currently authorized through an Individual Take Statement met in association with a Biological Opinion, only an individual who has been either authorized by a section 10(a) (1) (A) permit issued by the USFWS, or designated as an agent of the State of Florida by the FWC for such activities, is permitted to come in contact with or relocate an Eastern indigo snake.
4. An Eastern indigo snake monitoring report must be submitted to the appropriate Florida Field Office within 60 days of the conclusion of clearing phases. The report should be submitted whether or not Eastern indigo snakes are observed. The report should contain the following information:
   - Any sightings of Eastern indigo snakes
   - Other obligations required by the FWC, as stipulated in the permit.
5. The Service recommends the Applicant use as a minimum the *Standard Manatee Conditions for in-Water Work (2005 revision)*.

4.11.6 MMS Recommended Mitigation and Monitoring Measures

1. MMS Notice to Lessees and Operators (NTL) No. 2004-G05, *Biologically Sensitive Areas of the Gulf of Mexico*. This NTL provides and consolidates guidance for the avoidance and protection of biologically sensitive features and areas (i.e., topographic features, pinnacles, live bottoms (low-relief features), and other potentially sensitive biological features) when conducting Outer Continental Shelf (OCS) operations in water depths less than 400 meters (1,312 feet) in the GOM. This NTL supersedes and replaces NTL No. 98-12, Implementation of Consistent Biological Stipulation Measures in the Central and Western GOM, effective August 10, 1998, and NTL No. 99-G16, Live-Bottom Surveys and Reports, effective July 8, 1999. For guidance on avoiding biologically sensitive areas in water depths 400 meters (1,312 feet) or greater, refer to NTL No. 2000-G20, Deepwater Chemosynthetic Communities, effective December 6, 2000.
2. MMS NTL No. 2005-G07, *Well Records Submittal*, as well as through its other published guidelines, including NTL No. 2008-G05, *Shallow Hazards Program*. MMS has issued regulations at 30 CFR 250.194, 250(b)(15), 250.203(o), 250.204(b)(8)(v)(a), 250.204(s), and 250.1007(a)(5) that require preparation of an archeological resources report based primarily on the assessment of data obtained from the remote sensing survey. These NTLs work to describe the survey parameters, reports, analyses, and mitigation that will ensure that cultural resources are protected.
3. MMS NTL No. 2007-G03, *Marine Trash and Debris Awareness and Elimination*. The discharge and disposal of garbage and other solid debris from vessels by lessees is prohibited and designed to mitigate impacts of marine debris. The discharge of plastics is strictly prohibited and therefore never authorized and all plastics must be returned to shore. These prohibitions on the discharge and disposal of garbage and other solid debris from vessels would be incorporated as enforceable conditions into the DWPA license. The USCG enforces MARPOL and the Deepwater Port License and fines or penalties could be assessed where laws and regulations are violated.
4. MMS NTL NO. 2007-G04, *Vessel Strike and Avoidance and Injured/Dead Protected Species Reporting*. MMS has issued regulations in 30 CFR 250.103 and 30 CFR 250.282 to update the guidelines to implement monitoring programs to minimize the risk of vessel strikes to protected

species and report observations of injured or dead protected species Designed to mitigate impacts on nonthreatened and nonendangered marine mammals. Any vessel strike of a nonthreatened and nonendangered marine mammal would be considered a "take" under both the MMPA and ESA.

5. MMS NTL No. 2007-G14, Pipeline Risers Subject to the Platform Verification Program. MMS has issued under 30 CFR 250.910(b) (1) (i) and (2) (i), pipeline risers connected to floating platforms are subject to the platform verification program as associated structures. The Minerals Management Service (MMS) Gulf of Mexico OCS Region (GOMR) has determined that new pipeline risers are subject to a separate verification process that necessitates the use of an independent Certified Verification Agent (CVA) specifically for the pipeline riser. These pipeline risers are a critical component of any floating platform proposal and must meet stringent requirements for design, fabrication, and installation.

6. *MMS NTL No. 2007-G20, Coastal Zone Management Program Requirements for OCS Right-of-way Pipeline Applications. MMS* issued guidelines pursuant to 30 CFR 250.101(a) and 30 CFR 250.103 and in accordance with 15 CFR 930.53(d) to provide notice and assistance regarding compliance with the Coastal Zone Management Act (CZMA) Federal consistency regulations. The guidelines are intended to ensure that any required Federal license or permit activity affecting any coastal use or resource is conducted in a manner consistent with approved coastal zone management programs (CZMP).

7. MMS recommends the Applicant conduct an as-built survey of the constructed pipeline and submit the survey to the USCG and Maritime Administration and other agencies as appropriate after construction is completed.

5. Public Safety

5.1 Introduction

The transportation, handling, storage, and processing of LNG and transportation of associated natural gas require strict controls to minimize potential risks and interruptions of gas supplies. This section provides an overview of issues that would affect the safe and reliable operation of Port Dolphin. This section is limited to design, engineering, and operational components of Port Dolphin infrastructure that directly or indirectly have the potential to impact public safety. Reliability of overseas LNG supplies and shipping is outside the scope of the EIS.

The Applicant has proposed Port Dolphin as an uninterrupted source of natural gas operating 24 hours a day, 365 days a year. If the Maritime Administration approves the License, the USCG would review and approve all design, engineering, operations, safety, security, and personnel qualification requirements by USCG prior to installation and at-sea construction of Port Dolphin. USCG's review would include a thorough evaluation of the Applicant's measures to manage safety risks. Relevant standards applicable to offshore and onshore LNG facilities also would be applied to Port Dolphin.

5.2 LNG Hazards

5.2.1 Physical Properties

LNG is approximately 95 percent methane (natural gas) in liquid form. When the gas is cooled to minus 162 °C (minus 260 °F), it decreases in volume and becomes a clear and odorless liquid. LNG is transported and stored at near atmospheric pressures. As the liquid vaporizes and expands to form a gas, a pressure slightly above atmospheric pressure is maintained. This elevated pressure precludes air from entering the storage container.

LNG has several physical properties that are of interest including the following:

1. LNG is not toxic but can act as an asphyxiant by displacing air.
2. When initially released, cold LNG vapor remains heavier than air until it warms up and becomes buoyant at minus 71 ºC (160 °F).
3. Natural gas at normal temperature is lighter than air.
4. When mixed with air, natural gas is flammable within the range of 5 to 15 percent concentration of methane.
5. Natural gas has the highest auto-ignition temperature compared to other fuels (e.g., liquefied petroleum gas, gasoline, and diesel).

When spilled on water, a physical phenomenon not involving combustion, called a rapid phase transition (RPT), can occur as the LNG rapidly transitions from its liquid phase to its gas phase.

Methane, the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic but is classified as a simple asphyxiant, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death.

Methane has an ignition temperature of 538 ºC (1,000 °F) and is flammable at concentrations between 5 and 15 percent in air. Experience and testing indicate that unconfined natural gas vapor clouds do not

explode. As the degree of confinement and congestion in the area surrounding the leak increases, the potential to explode rather than to flash also increases (Lees 1996). In all cases, LNG vapors must be within the flammable range, and an ignition source must be available to result in a fire (Juckett 2002). In the absence of an ignition source, a potentially flammable plume would migrate from the LNG leak source until the leak is isolated or the LNG supply is exhausted and the air dilutes the concentration of natural gas to below the lower flammability limit (LFL). Due to the physical properties of natural gas, the gas cloud would quickly become buoyant. However, as described in **Section 5.2.4**, a flammable concentration of methane gas in a vapor cloud within an unconfined space in the presence of an ignition source would not explode.

Regardless of the cause, the formation of a methane/air mixture and its movement depends on the quantity and rate of the spill, whether it is on land or water, the atmospheric stability, the wind direction and velocity, and the temperature of the atmosphere and water.

The following five major hazard conditions associated with LNG could have significant impacts over wide areas:

- Thermal radiation (flux) hazards
- Pool fires
- Flammable vapor clouds
- Cryogenic hazards
- Rapid phase transition.

5.2.2 Thermal Radiation (Flux) Hazards

Thermal radiation (flux) hazards can result from ignition of an LNG pool or ignition of a flammable LNG vapor cloud. Thermal radiation is the heat that is felt from the source. Hazards to humans include burns ranging from first- to third-degree burns and can result in moderate to severe injury or possible death. The degree of thermal radiation hazard depends on a number of factors, including distance from the thermal radiation source, exposure time, and shielding via personal protective equipment or structures. Other thermal- (fire-) related hazards to humans include smoke inhalation and asphyxiation due to lack of oxygen.

Hazards to vessels and equipment are also possible due to thermal radiation. Literature reviewed indicates that thermal flux levels of 37.5 kilowatts per square meter (kW/m^2) can cause damage to steel tanks and process equipment. Thermal radiation hazards could result from LNG pool fires or ignition of an LNG vapor cloud, which are discussed below. **Section 5.4** provides additional details regarding thermal radiation hazards and impact distances associated with pool fires and flammable vapor clouds.

5.2.3 Pool Fires

Any rapid release of an LNG onto water from any of the SRVs could result in a pool fire if there is an ignition source. In the event of a release of LNG, the LNG would float on top of the water and a pool would form. Heat from the seawater would warm the LNG pool and release vapors of natural gas. A pool fire could occur in cases where methane rising from the surface of the pool combines with the proper mixture of oxygen (see **Section 5.2.4**) and then comes in contact with an ignition source. A large pool fire scenario is likely to be the highest risk in terms of a thermal hazard radius. Most intentional events are expected to provide an ignition source so that a pool fire occurs, and therefore formation of a large un-ignited vapor cloud is unlikely.

5.2.4 Flammable Vapor Clouds

When LNG is spilled and exposed to the atmosphere, it would absorb heat from the seawater and ambient air, forming a heavy, cold cloud that can be visible due to condensed moisture in the air. Because of the material's density and the turbulence created by the rapid boiling, an LNG spill would spread and vaporize rapidly. The initial cold air and LNG gas mixture is not buoyant in air between minus 162 and minus 108 ºC (minus 260 and minus 162 °F). In the natural gas cloud, the amount of gas mixing with air would not be uniform, and pockets of the flammable gas/air mixture might exist in regions of the cloud that are generally outside the flammability limits of methane (USCG and MARAD 2003). If this flammable plume encounters an ignition source, a fire would flash back to the source of the spill, causing potentially serious burns to individuals within the flammable concentration zone. Due to the high probability that an ignition source would be present, sustained development and dispersion of a flammable vapor cloud is less likely to occur.

Thermal radiation (e.g., the heat that is felt when standing in front of a fire) is the primary mechanism of heat transfer from the burning methane to an individual or structure (USCG and MARAD 2003). When LNG initially vaporizes from its liquid to its gaseous state, the methane concentration is high, resulting in insufficient oxygen levels to support combustion. When the concentration of methane decreases to 15 percent of the vapor/air mixture (15 percent methane, 85 percent air), the methane will burn if ignited. This is the upper flammability limit (UFL). As the vapor continues to mix with more of the surrounding air, its concentration continues to decrease. When the mixture is diluted to concentrations below 5 percent methane (5 percent methane, 95 percent air) it becomes too lean to burn; this is known as the LFL. When an unconfined cloud containing a natural gas/air mixture burns in the open, the flame generally spreads from the ignition source back over the surface of the LNG vapor cloud.

The flame's rate of spread is only a few miles per hour. This flame speed is too slow to generate an explosion. Instead, the flame would burn back to the source, and the primary concern would be the radiant heat generated from the fire, and the flames themselves. For LNG to cause an explosion, the vapor cloud must be confined. Large-scale field tests determined that releases of methane into the open air or onto water will not explode if ignited. Any methane that does not burn after being diluted below its LFL will dissipate into the atmosphere.

5.2.5 Cryogenic Hazards

As a cryogenic liquid, LNG quickly cools the materials it contacts and causes extreme thermal stress in materials not specifically designed for ultra-cold conditions. These thermal stresses can cause brittleness or loss of tensile strength, and possible fracture of common materials of construction (FERC 2003). Regarding worker safety, potential hazards include exposure to low-temperature LNG and asphyxiation by concentrated vapors. The low temperature is sufficient to rapidly cause the equivalent of frostbite or, if enough of the body surface is exposed, death via freezing of the tissue. The timeframe for these potential impacts is limited. Even though the LNG vapor cloud is not toxic, the cloud might displace enough air to make the atmosphere unsafe for humans to breathe. This represents a hazard to the personnel close to the release, especially if there is some confinement that traps the vapor and allows the concentration to build up in the area.

5.2.6 Rapid Phase Transition

RPT occurs when LNG comes in direct contact with warmer water. In some cases, the rapid uncontrolled expansion of LNG as it changes phase from a liquid to a gas could result in an explosion caused by the physical energy released during the rapid expansion of the liquid to gas (Lees 1996). Since 1981, the Society of Petroleum Engineers has sponsored several projects to investigate and develop a methodology

for producing quantified estimates of the risk associated with RPTs. Progress from this work is reported monthly in the *Journal of Petroleum Technology.* The hazard zones extending from an RPT would not be as large as either a vapor cloud or pool fire hazard zone. RPT accidents are probably the lowest concern of the three mentioned here (Havens 2003).

5.3 Evaluation of Public Safety

During the initial public scoping meetings for Port Dolphin, USCG received various comments requesting that a hazard study be completed to identify the risks and consequences associated with the Port Dolphin Project. Per the Deepwater Port regulations 33 CFR 148.105 (y), a project-specific independent risk assessment (IRA) was conducted. Further details of the IRA can be found in **Section 5.4**. The Final IRA is included as **Appendix J** of this EIS.

5.3.1 Safety Review Criteria

The safety review criteria used to complete the IRA were provided by USCG with guidance from Sandia National Laboratories (Sandia). In completing the IRA for USCG, Acutech, Inc., identified credible accidental and intentional scenario hazards, incorporated site-specific conditions, reviewed direct impacts on the public, and identified the bounding case (worst credible impact). The IRA reported resulting pool fire thermal radiation hazard distances and vapor dispersion hazard distances to the LFL for an unignited vapor cloud, based on modeling performed for bounding accidental and intentional release scenarios. The process and considerations involved in modeling and developing the IRA are summarized below.

5.3.1.1 Credible Range of Release Scenarios

The evaluation of public safety must include an objective analysis of the potential impact of Port Dolphin to public safety and property. During development of the IRA, a wide range of potential scenarios were considered involving both accidental and intentional release hazards. Input in determining the potential hazards was obtained from a number of qualified Federal, state, and local experts during a 2-day hazards identification (HAZID) workshop conducted on August 1 and 2, 2007, at the USCG Prevention Office in Tampa, Florida. Participants included representatives from USCG CG-5225, USCG Sector, USCG Pollution, and USCG Security; the U.S. Maritime Administration; Joint Terrorism Task Force (JTTF) (FBI); the Cooperative Vessel Traffic Service; Florida Department of Law Enforcement; Florida Department of Environmental Protection; Florida Fish and Wildlife Commission; Agency of Bay Management; Tampa Police Department; industry/Port Security; Port Manatee Authority and the local emergency planning committee; and the Applicant. The meeting was facilitated by Acutech. The risk analysis process is shown in the IRA.

The HAZID process identified potential accidental and intentional release scenarios. Eleven potential accidental release cases were developed for consideration. In addition, intentional release scenarios were reviewed and analyzed. From the identified hazards, four release cases were identified and chosen to bracket the worst credible range of potential accidental and intentional LNG release scenarios on which to base the public safety evaluation. Further details regarding the identified hazards on which the IRA was based are provided in **Section 5.4**.

5.3.1.2 Site-Specific Input Data

Site-specific input data used in completing the risk assessment included a description of Port Dolphin; design information; proposed alternative locations; sizes of the SRVs; operating conditions for the offloading, storage, and regasification processes; meteorological data; and marine traffic data for the

Project area. Additional vessel traffic data from a number of sources were reviewed as part of the IRA for vessels transiting the vicinity of Port Dolphin.

5.3.1.3 Direct Impact on the Public

The purpose of the public safety evaluation and IRA is to review Port Dolphin's potential safety and security impacts on the public and property in the subject deepwater port area. The IRA considered potential direct impacts on humans and property from a potential worst-case release of LNG from Port Dolphin. Indirect impacts on the public and property (e.g., economic impacts resulting from an LNG release) are not included in the public safety evaluation.

5.3.1.4 Bounding Case (Worst Credible Impact)

The public safety evaluation and IRA process represents a deterministic assessment of the worst credible release scenarios representing maximum expected impacts from accidental and intentional events. What resulted from the evaluation were a representative set of scenarios and identification of the most significant potential and credible impacts (bounding cases) that could be used to access the public risks associated with construction and operation of Port Dolphin.

5.3.2 Sandia National Laboratory Guidelines

In 2004, the DOE commissioned Sandia to develop a risk-based analysis approach to assess and quantify potential hazards and consequences of an LNG spill from an LNG Carrier (LNGC). Sandia utilized previously completed studies and conducted its own studies to determine the hazards of an LNG spill. Sandia also developed risk management strategies to minimize the likelihood of an incident. The 2004 Sandia report (Sandia 2004) is typically used as the industry standard and benchmark on which to base Project-specific risk assessment studies.

The IRA followed the baseline guidance for accidental and intentional breach models of LNGC inner hulls provided in SAND2004-6258 (Sandia 2004).

Acutech worked directly with Sandia and USCG to apply site-specific conditions and parameters for the Port Dolphin IRA process. Due to Port Dolphin's offshore location, Sandia collision data were extrapolated to account for larger ocean-going vessels with higher potential vessel energy that could occur in the vicinity of Port Dolphin.

With respect to potential intentional threats, Sandia guidance suggested that the threat, breach, spill, and hazard analyses should be conducted on a site-specific basis (Sandia 2004). Acutech, in conjunction with Sandia and USCG, utilized site-specific conditions and scenarios to assess the threat and consequence of intentional LNG incidents.

Because of the increasing size and capacity of many new LNGCs, at the request of the DOE, Sandia conducted detailed breach analysis for large LNGCs ranging up to 265,000 cubic meters (m^3) (9,358,387 ft^3). Based on the analyses for emerging LNG tanker designs up to 265,000 m^3 (9,358,387 ft^3), the range of breach sizes calculated for credible intentional scenarios appropriate for near-shore operations, where there is waterway surveillance, monitoring and control, ranged between 2 to 12 m^2 (22 to 129 ft^2). For offshore operations, where there is less control and surveillance of ship operations, credible intentional scenarios can be larger and the calculated breach sizes can range from 5 to 16 m^2 (54 to 172 ft^2), with the most likely or nominal intentional breaching scenario resulting in an LNG cargo tank breach of approximately 12 m^2 (129 ft^2) (Sandia 2008). Sandia, in their 2008 report, (Sandia 2008), concludes that the worst-case scenario to public safety and property for these large LNGCs would be

within 700 m (2,297 ft) of a spill, with minor damages as far reaching as 2,000 m (6,562 ft). Therefore, Sandia concludes that there is minimal risk to public safety and property even from a large LNGC spill given the locations of the proposed facilities.

5.3.3 Government Accountability Office Study

A study was conducted by the Government Accountability Office (GAO) to describe the results of recent studies on the consequences of an LNG spill, and to identify areas of agreement and disagreement among experts regarding the consequences of a terrorist attack on an LNG tanker. The GAO published its report in February 2007, and it is summarized as follows:

- The primary hazard to the public is heat hazard from a fire. Explosions are unlikely, and hazards like cryogenic effects and asphyxiation do not pose a danger to the public.
- Heat hazard baseline distances from the heat hazard zones using Sandia's guidelines are either appropriate or conservative.
- Surface emissive power of LNG fires will be lower for large fires because oxygen in the middle of the fire would lead to more smoke production, which would block some of the heat from the fire.
- Cascading failure events are not likely to greatly increase (by more than 20 to 30 percent) the overall fire size or heat hazard ranges.
- Sandia's conclusion that consequence studies should be used to support comprehensive, risk-based management and planning approaches for identifying, presenting, and mitigating hazards from potential spills is appropriate.
- The priorities for research that are funded by Congress include large-scale experiments on water; the potential for cascading failures of multiple tanks; and improved techniques especially related to inshore ports.

In December 2007, the GAO released a second report on the potential terrorism threat in the United States to "energy commodity tankers" including LNGCs (GAO 2007b). The report identifies three issues to be addressed to ensure effective response efforts especially related to onshore ports:

- Spill response plans and anti-terrorism and security plans should be coordinated at the regional level and the facility level
- Ports need to develop plans to address economic issues if there is a terrorist event, such as prioritizing vessel movements
- Adequate response resources are needed to respond to an attack.

USCG has considered these challenges as they apply to the Project and would not authorize operation of the Port unless issues are adequately addressed. USCG will continue to address these issues during finalization of the Operations Manual and will reassess these issues during operation of the Port, if the Project is licensed.

5.3.4 Impacts on Public Safety and Property

The potential impacts on public safety and property from a deepwater port, LNG vessels, and process equipment are described on the following page. Potential impacts from marine shipping and the pipelines are described in **Sections 5.5** and **5.6**, respectively.

5.3.4.1 Deepwater Port

At present, the Gulf Gateway Energy Bridge project, which commenced operations in 2005, and the Northeast Gateway Deepwater Port in Massachusetts Bay, which commenced operations in 2008, are the only operating offshore deepwater ports in the United States at this time. A review of available information indicates that no incidents have been recorded regarding impacts on public safety and property associated with these deepwater port facilities; most available information is focused on land-based facilities. Guidance documents for building offshore LNG storage and regasification terminals have recently been produced by the Classification Societies (American Bureau of Shipping, Bureau Veritas, Det Norske Veritas, and Lloyds Register). The review of available information indicates that only seven incidents have been documented over approximately the past 75 years with one or more (worker or public) fatalities associated directly with operations at land-based LNG facilities: (1) Skikda, Algeria, January 2004; (2) Bontang, Indonesia, 1983; (3) Maryland, United States, 1979; (4) Arzew, Algeria, 1977; (5) Texas, United States, 1973; (6) Raunheim, Germany, 1966; and (7) Ohio, United States, 1944. Brief descriptions of these incidents are included in **Appendix K.**

5.3.4.2 LNG Vessels

According to the IRA, approximately 100,000 LNGC voyages have taken place, covering more than 235 million miles while loaded, with no major accidents, safety problems, recorded fatalities to vessel crew or the general public, or recorded fires on deck or within cargo areas. Over the life of the industry, 16 cargo transfer incidents have resulted in limited LNG spills with some damage. These spills have resulted in some damage to the carrier, but no LNG fires have occurred (Sandia 2004). The most significant damage resulting from LNG leakage involved a deck or plating fracture from cryogenic embrittlement (CH-IV International 2004). An additional 11 incidents involved a vessel collision, a vessel running aground, or vessel fracture due to high seas deflection stresses (see **Appendix K**). However, none of these 11 incidents resulted in the spill of LNG (CH-IV International 2004).

As of January 2009, the world's LNG fleet is composed of 298 active LNGCs, with another 79 LNG vessels on order (Colton 2009a, 2009b). The LNG capacities of these active ships range from 1,100 m^3 to 216,200 m^3(38,846 to 7,635,031 ft^3). Currently, all of these LNGCs operate (or intend to operate) under a foreign flag with foreign crews and must have a Letter of Compliance inspection from USCG to verify compliance with international safety standards. There is a requirement for all foreign LNG flag ships to have the ability to communicate in English (USCG and MARAD 2003).

The LNG containment system in the SRVs proposed for Port Dolphin would be able to withstand any potential degree of "sloshing" during transportation and unloading resulting from partially loaded tanks. The integrity of the reinforced insulation boxes, structural reinforcement of the cargo inner hull, and strengthened cargo pump towers have been verified by testing. In addition, they have been approved by appropriate third-party engineering certification companies. For maximum ship maneuvering capability, each SRV would be equipped with bow and stern thrusters, and a maneuvering assistance and positioning system that provides automatic heading and direction of the thrusters and main propulsion. This system controls the SRV's position within approximately 10 meters (33 feet) during buoy retrieval operations. All SRVs would be assisted by a dedicated tug during docking activities.

Port Dolphin's SRVs would be designed to reduce the potential for accidental events during the transport of the LNG or any other maritime operation. Similarly, the SRVs have been designed to reduce potential accidents during the regasification process. Final design for the SRVs and their operating systems would be subjected to all of the tests and verifications necessary to certify the engineering integrity of the ship and its systems, in accordance with all international standards for LNG vessel operation on the high seas. The cargo tanks for all SRVs would have "double containment" cryogenic liquid barriers that include a

complete inner tank within a complete outer tank, and would be designed to withstand the LNG temperatures. The design would adhere to standards established in the IMO Maritime Safety Committee Resolution 59(67), International Code for Construction and Equipment of Ships Carrying Liquefied Gasses in Bulk (IGC Code). The inter-barrier space of the double barrier containment system would be continually purged with nitrogen, and the outlet flow would be monitored by gas detectors. In the unlikely event of a primary containment system leak, the leak would be detected immediately and appropriate corrective measures would be initiated. Any pressure increases would be vented through one of the vent stacks on the upper trunk deck of the SRV. The secondary barrier of the double containment system would prevent any LNG leakage. Once the offloading operation is complete, nitrogen would be injected into the inter-barrier space until it is purged of natural gas. The cargo tank would be purged with inert gas slowly warmed to ambient temperature. The inert gas then would be purged using fresh air, making the cargo tank safe for entry by personnel who would identify and repair the leak. All internal piping for LNG and water would meet or exceed all applicable standards for structural integrity, temperature, and corrosion resistance.

In addition to the double-containment cargo tanks, the SRVs would have two carbon steel inner and outer hulls. The design provides for liquid-tight barriers between the LNG and a failure scenario involving mechanical penetration of the tank initiated externally. In such cases, all four barriers would need to be breached before LNG could be released from the tank. In the event of a catastrophic failure of the inner barriers, LNG could come into contact with the hull material, which is not designed for cryogenic temperatures and would be expected to fail. However, the most common failure scenario for the inner barriers tends to be the development of porosity or cracks; this tends to cause a gradual increase over time in the amount of gas leaking into the inter-barrier space, which is monitored for gas leakage. Thus, any leak into the inter-barrier space would be readily identified.

5.3.4.3 Marine Safety

In December 2002, at the urging of USCG, the United Nation's IMO Maritime Safety Committee developed amendments to the 1974 International Convention for Safety of Life at Sea (SOLAS) intended to enhance maritime security. The new International Ship and Port Facility Security (ISPS) Code was also adopted to provide a standardized, consistent framework for evaluating risk, enabling governments to offset changes in threat with changes in vulnerability for ship and port facilities. The implementation schedule of both the SOLAS amendments and the ISPS Code was July 1, 2004.

On a national front, the U.S. Congress enacted the Maritime Transportation Security Act (MTSA) in November 2002, which was designed to protect U.S. ports and waterways from a terrorist attack by requiring area maritime security committees and security plans for facilities and vessels that might be involved in a transportation security incident. In response to the terrorist attacks on September 11, 2001, USCG reaffirmed its Maritime Homeland Security mission and its lead role, in coordination with other Federal, state, and local agencies; owners and operators of vessels and marine facilities; and other entities with interests in the U.S. Marine Transportation System (MTS), to detect, deter, disrupt, and respond to attacks by terrorist organizations against U.S. territory, population, vessels, facilities, and critical maritime infrastructure.

Accordingly, USCG developed maritime security rules that require owners and operators of certain facilities in U.S. ports, and certain vessels operating in U.S. waters, to conduct a Facility/Vessel Security Assessment (FSA), name a Facility/Vessel Security Officer (FSO), and develop and implement a Facility/Vessel Security Plan (FSP). In addition, USCG, in conjunction with local stakeholders, prepared a site-specific IRA which will form the basis of development of operational and security procedures in the deepwater port operations manual. If a License is issued, USCG would require that Port Dolphin facilities and SRVs develop assessments and plans to ensure consistency with MTSA requirements.

5.4 Deepwater Port Risk Assessment

In response to the Application filed with the USCG and the Maritime Administration for Port Dolphin, the potential risks to the public from the Project, based on a large-scale release of LNG, were reviewed and an IRA was prepared (see **Appendix J**).

The USCG Office of Operating and Environmental Standards, Deepwater Port Standards Division (CG-5225) directed the scope and content of the IRA. The Applicant did not influence the technical direction of the work performed for the IRA and was not allowed to review the work before it was released to the public.

5.4.1 Purpose and Objectives

The purpose of the IRA was to develop a stand-alone technical report on the potential risks to the public from the proposed Project based on a large-scale release of LNG. The primary objective of the IRA was to assess impacts on the public and property not associated with the proposed deepwater Port from an event that compromised LNG containment. The secondary objective of the IRA was to qualitatively analyze the process safety hazards if they might cascade beyond the identified maximum credible breach scenarios.

The IRA consisted of a systems-level risk assessment that considered operations related to the transfer, storage, and regasification of the Project. The IRA did not evaluate risks associated with natural gas releases from the subsea pipelines. Information regarding safety of the offshore pipelines is provided in **Section 5.6**.

5.4.2 Technical Approach

The IRA risk analysis process involved the following six steps:

1. *Deepwater Port area characterization*—the deepwater Port application was reviewed, and additional data, as required, were gathered and analyzed about the proposed Port environment.
2. *HAZID process*—input was received from various stakeholders to identify accidental and intentional scenarios that could potentially compromise the LNG tanks.
3. *Scenario development*—the HAZID scenarios were further analyzed to determine credible scenarios.
4. *Vessel frequency collision analysis*—the types of vessels and frequency of potential collision were analyzed.
5. *Consequences analysis*—the impacts of the bounding cases (i.e., largest credible scenario) were analyzed using computational fluid dynamics modeling.
6. *Results and conclusions*—the analysis results were addressed and presented.

The conclusions of the IRA are presented as hazard zones for thermal radiation due to pool fire, and vapor cloud dispersion for the accidental and intentional release scenarios evaluated. Since the hazard zones are based on the breach size, release volumes, and weather conditions, the estimated size of the hazard zones would not be influenced by the size or configuration of the Safety Zones or area to be avoided (ATBA), or whether Port Dolphin is at the proposed location or at an alternative location. Thus, the size of each of the hazard zones depicted in the IRA would be identical, independent of the proposed and alternative locations as described in this EIS. While the IRA considered potential impacts on the public and

property, it did not attempt to predict the number of potential fatalities or injuries from these events. Also, the study was done without considering any mitigation measures that would be implemented to reduce the risk of accidental or intentional release of LNG from the proposed Project; therefore, the study provides evaluation of bounding cases. The risk management approaches are likely to reduce both the potential for and hazards of accidental and intentional events.

5.4.3 Deepwater Port Potential Impact

As described in **Section 5.3.1.1**, potential accidental and intentional release scenarios were selected to bind the credible range of potential accidental and intentional LNG release scenarios on which to base the public safety evaluation. Further details regarding the identified hazards on which the IRA was based are provided in **Appendix J.**

5.4.3.1 Accidental Scenarios

The HAZID identified 11 potential accidental release scenarios that have the potential to result in a release of LNG. The scenarios included vessel collision, shipboard mechanical system failure, fire, LNG release at process equipment, severe weather, structural failure of the LNG SRV, grounding, natural phenomena, mooring system failure, dropped objects, aviation accident, and buoy entanglement.

Collisions. Although no reported marine accidents resulting in a breach of LNG containment have ever been documented during the history of maritime transportation, marine collision scenarios were included for further consideration. The expected breach size on the inner hull of an LNG SRV from a vessel collision scenario is represented in Section 5.3 of the IRA (see **Appendix J**). Deepwater Port groundings were ruled out as not being likely due to its offshore location.

Process Related. In addition to the accidental marine collision and intentional attack scenarios considered in the IRA, several other types of events are possible aboard these vessels that could result in significant LNG spills. Process-related releases could occur because of the substantial topside processing equipment on SRVs for regasification of LNG and distribution of natural gas from the buoys to the subsea piping. These scenarios involve accidental equipment failures, human errors, or external events that could result in a release of LNG or natural gas, leading to fires, explosions, or other serious shipboard events.

LNG regasification vessels are designed to carry cryogenic gases and follow more stringent IMO regulations that govern their construction and operation, including fire and gas detection systems, emergency shutdowns, and fire and vapor suppression systems. These regulated safety features significantly reduce the likelihood of an accidental LNG release at the proposed deepwater Port. Additionally, these safety features would mitigate any release, regardless of its cause.

The process-related scenarios identified in the HAZID study were not analyzed in the IRA. These types of releases were determined to have smaller potential release sizes (e.g., the potential hole size, inventory available for release, and duration of release) and a lower potential to escalate (due to the safety and emergency shutdown systems) as compared to other accidental and intentional cases for which a detailed examination of the consequences was performed. The lower likelihood for catastrophic accidental events is based on the regulations covering LNG vessels, the safety record of the LNG industry (both onshore and transportation), and the associated safety features onboard LNG regasification vessels. Therefore, while process releases are credible scenarios, they do not represent the bounding consequence case for accidental or intentional events. USCG would require that, if a License is issued, a condition be added to the Record of Decision (ROD) associated with this EIS requiring further work in HAZID and risk management of process-related scenarios for development of the Operations Manual and the FSP. These

activities would take place along with other post-licensing activities, including design, operation, and security reviews and approvals.

Hurricanes. A review of potential sea state and weather conditions, mooring and connection operating conditions for the deepwater port facility, mitigation, procedural safeguards, and recent test case data for Excelerate Energy's Deepwater Port facility off Louisiana during the 2005 hurricane season indicated that weather-related events also would not be a credible binding case. The IRA reports there were 302 storms that gained tropical storm strength during the 2000 Atlantic Basin hurricane season. These storms are defined as having maximum sustained winds no greater than 61 kilometers per hour (38 miles per hour). A tropical storm becomes a hurricane (e.g., a 100-year extra tropical storm) when winds reach 119 kilometers per hours (74 miles per hour). The Applicant would stop regasification and send-out operations well in advance of any tropical hurricane that might endanger the vessel (IRA). Since the SRVs would evacuate Port Dolphin and the surrounding area in the event of severe weather, weather-related hazards therefore were not considered further.

Intentional Scenarios. The HAZID team also reviewed a number of intentional release scenarios. Sandia worked closely with intelligence agencies to identify site-specific credible incidents that would bind the likely potential consequences of an LNG release. Due to the sensitive nature of this information, details of the analysis are not provided. The IRA did conclude, however, that the intentional release scenarios were not considered highly likely to occur due to multiple countermeasures that include MTSA requirements, USCG operational requirements, and operational procedures and programs proposed by the Applicant. Final countermeasures, as determined by USCG, would be included in the Operations Manual.

5.4.3.2 Summary of IRA Findings

There are four potential consequences of an LNG release over water: pool fire, vapor cloud, vapor cloud flash fire and no event. The thermal radiation zones from pool fires and the flammable vapor cloud dispersion that defines the extent of a flash fire each have the potential to impact the public surrounding the Port. Therefore, thermal radiation distances from vapor pool fires, and vapor cloud dispersion are developed below.

5.4.3.3 LNG Release Scenarios

From the original potential and accidental release scenarios evaluated in the HAZID screening process, the IRA identified four credible LNG release scenarios for further evaluation. Heat flux calculations from pool fires and flammable vapor cloud dispersion calculations were outlined for both membrane and Moss LNG-type carriers. However, release scenarios were not considered highly likely to occur, due to multiple countermeasures that include MTSA requirements, USCG operational requirements, and operational procedures and programs proposed by the Applicant. The IRA defines and analyzes only the bounding intentional and vessel collision scenarios. Therefore, the intentional scenarios with the largest thermal radiation and flammable vapor dispersion results and the vessel collision scenario are presented below.

1. Intentional attack leading to a 16-m^2 (172 ft^2) breach in a single SRV tank.
2. Intentional attack leading to a 12-m^2 (129 ft^2) breach in two SRV tanks.
3. Intentional attack leading to a 12-m^2 (129 ft^2) breach in three SRV tanks (cascading damage).
4. Vessel collision leading to a 22-m^2 (237 ft^2) breach in a single LNGC tank.

5.4.3.4 Thermal Radiation Zones from Pool Fires

Thermal radiation hazard distances from a pool fire were estimated by the following two heat flux levels:

- **37.5 kW/m^2:** At this range, damage to process equipment and storage tanks for unprotected exposures, based on average 10-minute exposure duration, as well as immediate fatalities
- **5kW/m^2:** Permissible level for emergency operations lasting several minutes with appropriate clothing based on an average 10-minute exposure duration, and onset of second degree burns based on average 40-second exposed duration.

The pool fire thermal hazard distance analysis was performed by comparing four models: the standard solid flame model (Standard model [constant τ][1]), the two-zone solid flame model (FERC)[2], the three-zone solid flame model (Raj)[3], and LNGFIRE3.[4] The range of thermal radiation hazard distances predicted by the different models (including a sensitivity analysis of key parameters of the pool fire models) for the four binding case release scenarios evaluated in the IRA are listed in **Table 5.4-1,** and shown in **Figure 5.4-1**. These distances are measured from the center of the LNG pool. The maximum credible pool fire distance predicted by the IRA analysis resulted in an estimated distance of 4,680 m (15,354 ft) with a heat flux > 5kW/m^2.

Table 5.4-1. Maximum Thermal Radiation Zones for Binding Case Scenarios

Scenario	Scenario 5 Intentional	Scenario 6 Intentional	Scenario 7 Intentional Cascading	Scenario 8 Vessel Collision
Breach Size	16 m^2	12 m^2	12 m^2	22 m^2
Number of Tanks	1	2	3	1
Tank Capacity	54,362 m^3	108,724 m^3	163,086 m^3	54,362 m^3
Projected Release Quantity	48,330 m^3	96,660 m^3	144,990 m^3	48,330 m^3
Pool Diameter	840 m	1,060 m	1,260 m	840 m
Heat Flux > 37.5 kW/m^2	1,390 m	1,710 m	1,990 m	1,390 m
Heat Flux >5 kW/m^2	3,140 m	3,960 m	4,680 m	3,140 m

Note: Data in **Table 5.4-1** are identical to Table 8-1 of the IRA

5.4.3.5 Flammable Vapor Cloud Dispersion

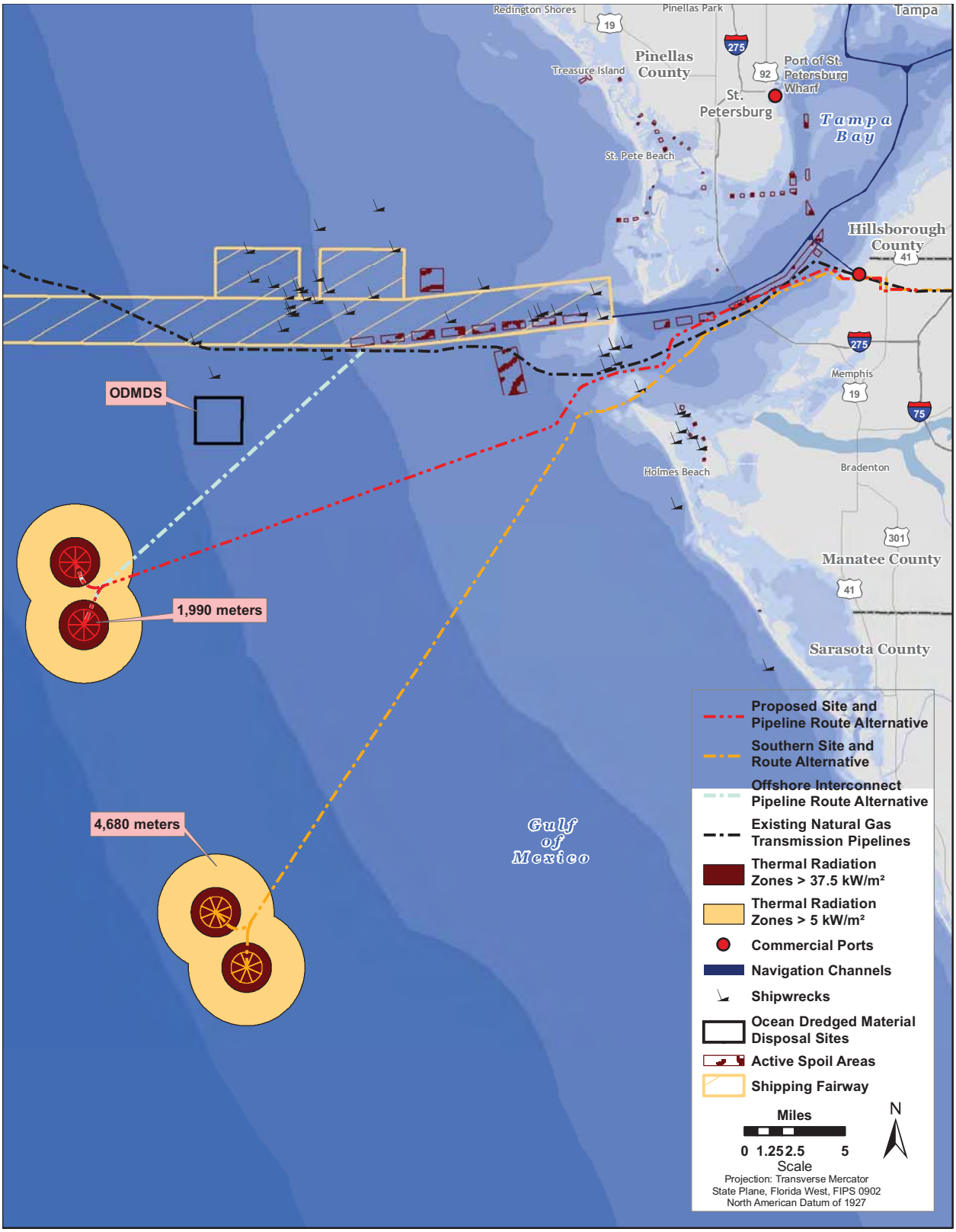
The vapor cloud dispersion hazard distance was determined as the maximum downwind distance to the LFL. The flammable vapor cloud dispersion simulations were performed using Fluent, a commercial Computational Fluid Dynamics (CFD) code. Fluent was validated for this study by comparison with experimental LNG vapor dispersion data from the Burro tests (see **Appendix J**).

[1] Sandia National Laboratories, "Guidance on risk analysis and safety implications of a large liquefied natural gas (LNG) spill over water", SAND2004-6258, (2005).

[2] FERC, "Notice of availability of detailed computations for the consequence assessment methods for incidents involving releases from liquefied natural gas carriers", Docket No. A04-6-000, June 29, 2004.

[3] Raj, P.K., "Large hydrocarbon fuel pool fires: Physical characteristics and thermal emission variations with height," Journal of Hazardous Materials, 140, pp. 280-292, (2007).

[4] "LNGFIRE3: A Thermal Radiation Model for LNG Fires," Topical Report GRI-04/0032.



Source of Proposed Pipeline: ConShelf 2009. Source of Southern Pipeline: ConShelf 2007. Source of Offshore Interconnect Alternative: e²M, Inc. 2008. Source of Thermal Radiation Zones: e²M, Inc. 2009.

Figure 5.4-1. Thermal Radiation Distances for Binding Case Scenarios

The maximum credible flammable vapor cloud distance to the LFL predicted by the IRA analysis also occurred with Intentional Scenario and resulted in a distance of 6,095 m (19,997 ft). Summary results for four scenarios are provided in **Table 5.4-2,** and shown in **Figure 5.4-2**.

Table 5.4-2. Maximum Credible Vapor Cloud Dispersion Distances for Binding Case Scenarios

Scenario	Scenario 5 Intentional	Scenario 6 Intentional	Scenario 7 Intentional Cascading	Scenario 8 Vessel Collision
Breach Size, m^2	16 m^2	12 m^2	12 m^2	22 m^2
Number of Tanks	1	2	3	1
Distance to LFL from the center of the LNG pool (meters)	4,980 m	6,095 m	Immediate ignition, no vapor cloud hazard	4,980 m

Note: Data in **Table 5.4-2** are identical to Table 8-2 of the IRA.
The results are based on worst combination of meteorological conditions (e.g., wind speed, water temperature) which would result in maximum hazard distances. It should be noted that higher wind speeds do not necessarily result in greater vapor plume distances.

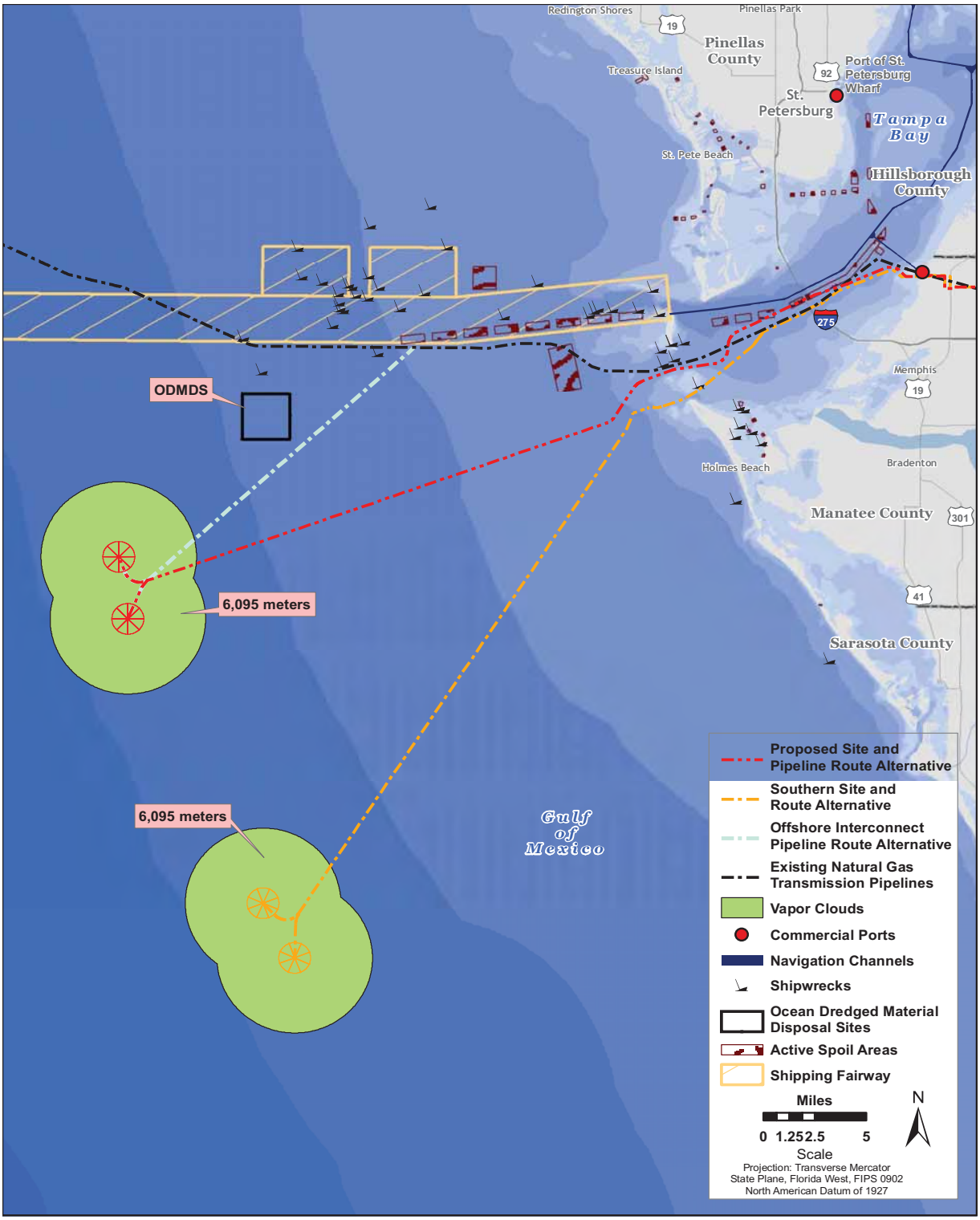
As discussed in **Appendix J**, the IRA models indicate there would be no direct impacts on public safety associated with a maximum modeled LNG release scenario at the extreme range of an unignited flammable LNG vapor/methane plume (distance to LFL). None of the thermal radiation zones from Scenarios 2 or 3 would extend to an adjacent buoy, shipping channels or the shore. See **Figure 8-2** of the IRA for overlay of the thermal radiation and flammable vapor cloud dispersion consequence results on the Port.

5.4.4 Risk Prevention and Minimization Strategies

In addition to the general risk preventions and minimization strategies discussed below, detailed prevention and mitigation strategies for both accidental and intentional release scenarios would be developed in a coordinated effort between USCG (CG-5225 and the Sector), local law enforcement officials, and the Applicant in the Operations Manual and FSP, if the Maritime Administration License is approved. Process design and operational reviews and approvals also would increase safety by further preventing or minimizing potential risks. Although ongoing, much of this activity is completed in the post-licensing phase of the application.

Safety and security criteria for vessel and port operations were used in evaluating the Port's location and would be critical components of the Port's design and operating procedures. For approval by USCG, the offshore location for Port Dolphin must be conducive to safety by minimizing any potential risks while simultaneously allowing for adequate security. The Port would be a minimum of 45 km (28 mi) from shore, and there are no existing offshore structures proximal to the proposed Port.

Federal regulations require all LNG vessels to provide a 96-hour advanced notice of arrival to USCG prior to entering any U.S. port. Information about the vessel and its voyage, including its port of origin, cargo on board, crewmembers, passengers, status of essential equipment, and special security information, must be provided with the notice of arrival. All persons would be screened by the National Vessel Movement Center prior to the vessel's entry. Complete details concerning the USCG's notice of arrival requirements can be found in 33 CFR Part 160.



Source of Proposed Pipeline: ConShelf 2009. Source of Southern Pipeline: ConShelf 2007. Source of Offshore Interconnect Alternative: e²M, Inc. 2008. Source of Vapor Clouds: e²M, Inc. 2009.

Figure 5.4-2. Vapor Pool Distances for Binding Case Scenarios

USCG may routinely complete facility inspections, shipboard safety and security examinations, vessel escorts, and cargo monitors while a vessel is in U.S. waters or at a facility discharging its LNG cargo. A detailed Emergency Response Plan would be part of the Operations Manual and Facility Security Plan that would require the approval of the USCG during the post-licensing phase prior to beginning of operations, if the Maritime Administration License is approved.

Under Maritime Transportation Security Act (MSTA) of 2002 and International Ship and Port Security (ISPS) regulations, shipping companies, vessels, and facilities are required to have a security officer and a comprehensive security plan to conduct their operations. Port Dolphin would be required to develop an FSP approved by USCG in accordance with Federal regulations. Similarly, SRVs would have a vessel security officer on board to oversee security measures. A vessel security plan would be required as well. This plan would necessitate USCG review and approval prior to entry into the Port. Both the facility and the vessel would require specific and detailed contingency procedures to be developed within their security plans. Implementation of these procedures would be required to enhance safety and security; and to protect the vessels, their cargo, and the marine environment.

5.5 Marine Safety

5.5.1 Marine Safety Standards

In accordance with 33 CFR Part 150, the licensee of the deepwater Port could not operate the Port without prior USCG approval of the Operations Manual. If the Maritime Administration License is granted to the Port Operator it would require that the Operations Manual address the requirements of the DWPA and provide detailed specifications and procedures for all aspects of Port operations and infrastructure. The Operations Manual would address security, emergency response, public and personal safety, protection of the environment, navigation, vessel movement, materials handling, and personnel qualifications. The Operations Manual would be required to address Port requirements for calling vessels, approaches, Safety Zones, port infrastructure, and pipelines.

If Port Dolphin is approved and commences operations, USCG would conduct regular inspections to ensure that the Operations Manual is being properly implemented. In addition, USCG would review the Operations Manual from time to time, and propose or require amendments as necessary to meet the intentions of the appropriate regulations and address potential changes in conditions.

Marine safety would be enhanced, in part, by navigation aid systems, fire and gas detection systems, emergency shutdown systems, and communication systems.

5.5.1.1 Navigation Aid Systems

The SRVs would be equipped with all appropriate navigational aid, light, and sound systems required for moored or berthed vessels in accordance with Convention on the International Regulations for Preventing Collisions At Sea, 1972, commonly referred to as the 72 COLREGS and implemented by 331 CFR 81. The navigation aid system would include obstruction lights, sound signals, radar beacon, and a separate independent battery charger and battery system. The navigation obstruction lights would be Class A lights with an 8-km (5-mi) range. The sound signals would be fog horns with a 3.2-km (2-mi) range, as required by 33 CFR 149.585. The radar beacon (RACON) would be capable of receiving signals from vessel radars and transmitting responding signals. An Automated Identification Information System (AIS) would transmit the name and position of the SRV.

5.5.1.2 Fire and Gas Detection System

The SRVs would have a fire and gas (F&G) detection system with triple modular redundancy (TMR). This system has both audible and visual alarms. The deluge systems would automatically be activated in the case of rate-of-rise heat detection or ultraviolet/infrared (UV/IR) detection.

The F&G system would have both zoned and specific-point detection for the presence of flammable gas, fire, smoke, or LNG spills above and below deck. The F&G system also would include line-monitored manual stations at strategic locations above and below deck. The F&G system inputs would include combustible gas detectors for open process areas that incorporate sensors using infrared absorption technology. Combustible gas detectors for enclosed spaces that incorporate sensors using catalytic bead-type sensors also would be used. Low-temperature, resistance thermal device (RTD)-type detectors would be used to monitor cryogenic spills.

Thermal detectors would be used to monitor fires in below-deck and open-process areas (fusible plug or RTD). The F&G system would also include UV/IR-type flame detectors for equipment handling combustible gas. Smoke detectors and break-glass-type manual alarm stations would be located throughout the vessel.

The F&G system would use one out of three Programmable Logic Controllers (PLCs) to take preprogrammed actions when F&G is detected. The PLC would be of the same type used for the ESD system, with the same TMR requirements.

5.5.1.3 Emergency Shutdown System

The Emergency Shutdown System (ESD) system would provide an effective sequence of operations that would lead the regasification process to a safe condition upon the occurrence of hazardous events. The ESD system would consist of a fault-tolerant, failsafe, and self-testing system. The system includes an ESD system workstation in the control room and controller and marshalling cabinets at other strategic locations on the vessel. A dedicated, hardwired ESD system control and alarm panel would be mounted on the console in the control room.

Three levels of shutdown would be considered:

- Level 1–total deepwater port shutdown
- Level 2–process area shutdown
- Level 3–local or individual packaged equipment shutdown.

Shutdown Levels 1 and 2 would be performed through the ESD system and activated through emergency push buttons in the control room or in the remote stations. Level 3 would be activated by abnormal process conditions or cascaded from Level 2 shutdown. A Level 3 shutdown would be performed through the distributed control system, package unit control systems, or the ESD system. The ESD system is currently a conceptual design. USCG would require that the Applicant submit an Operations Manual for approval by USCG and other appropriate authorities as a condition of the License, if issued. The Operations Manual would include detailed ESD procedures, shutdown instructions, and implementation scenarios.

5.5.1.4 Communications Systems

Communication systems on the SRVs would provide voice, alarm, and data communications. These systems would enable communication among SRVs underway or moored at the Port, multiple onshore

systems, the public telephone network, vessels, aircraft, the USCG Sector, and supporting personnel during evacuation and lifesaving activities in the event of an emergency situation. The vessels communications system also would include a microwave radio communication system and satellite communications system. A public address and alarm (PA&A) system, telephones, LAN, and defense communications system (DCS)/ESD data connections would be installed. An anti-collision radar system also would be included as part of Port Dolphin operations equipment. The LNG and support vessels would be equipped with marine and aeronautical radio systems, emergency and rescue radio systems, and a two-way land transportation radio system.

The two-way land transportation radio system would operate in the 811- to 860-megahertz band. Strategic locations would be equipped with an ultra-high frequency radio, very high frequency marine radio, and PA&A speakers. Each escape, SRV, and support craft would be equipped with an emergency position-indicating rescue beacon, search and rescue transponder, and a marine portable radio.

5.5.2 Navigational Safety Measures

5.5.2.1 Safety Zone

Surface Requirements. Under the DWPA implementing regulations, the USCG is authorized to establish a permanent mandatory Safety Zone around deepwater ports whether a vessel is present or not. The Safety Zone would extend approximately 850 m (2,789 feet) from the center of each buoy and encompass approximately 561 acres. This is a result of maintaining 500 m (1,641 feet) from the moored LNGC (maximum of approximately 350 m [1,148 feet] length) as it weathervanes (rotates) around the buoy. All unauthorized vessels would be prohibited from anchoring or transiting the proposed Safety Zone at any time. The USCG would have the primary jurisdiction for the Safety Zone.

5.5.2.2 No Anchoring Area and Area to be Avoided

If a License is issued, the USCG may designate a mandatory NAA and ATBA to further facilitate Port operations, safety, and security. These restrictions would extend beyond the buoy anchor that encompasses an approximate 1,500-m (4,922-feet) radius around each of the buoys. The NAA for the pipeline would encompass approximately 200 m (656 feet) along the centerline of the pipeline.

In general, the ATBA, NAA and Safety Zones around each buoy would be established at all times, and together would form a “barbell” shape where the ends of the barbell would encompass the Safety Zone around each buoy, and the ATBA would form the middle of the barbell extending between the two circular zones. SRV traffic would be coordinated by Port personnel. The actual size of the ATBA that would be requested of IMO would be determined through the advice and consent of USCG. The ATBA would appear on subsequent editions of the nautical charts. The ATBA is meant to discourage vessel traffic and is normally recommendatory. The Safety Zone, ATBA and NAA areas are shown in **Figure 2.3-10.**

5.5.3 LNG Vessel Support

5.5.3.1 Vessel Safety and Collision

To avoid vessel collisions, a continuous security watch would be maintained at strategic locations on the SRVs while underway and moored at a buoy. An average of approximately 50 SRVs would annually call on Port Dolphin. It is anticipated that the SRVs would approach Port Dolphin from the south and leave Port Dolphin heading back south. The vessels would follow prescribed routing procedures developed by USCG when arriving and leaving the Port to avoid collisions and to avoid or minimize other potential

impacts. Weather conditions, specifically current and wind direction, would influence all decisions on the mooring buoy approach and exit.

During operations, there would be dedicated tugs stationed at onshore facilities. These tugs would meet every inbound SRV and provide as-needed support for pushing, maneuvering, or towing while SRVs approach or exit the buoy. Due to their size and relatively low speeds, these support vessels would not have the vessel energy required to breach the hull of an SRV. The proposed support vessel traffic would be required to operate at all times under USCG rules and regulations, including any special operating regulations established for the Safety Zones and the ATBA.

5.5.3.2 Mooring and Berthing

The mooring buoy system proposed by the Applicant would allow SRVs to moor or berth at any time of the day or night, depending on weather conditions; however, final approval related to buoy mooring procedures would be made as part of USCG's review and approval of the proposed Port Dolphin Operations Manual.

It is anticipated that the complete cycle for each SRV would average 5 days and range between approximately 4 to 8 days, including buoy capture, hookup, offloading, and disconnect. SRVs would not be refueled while at Port Dolphin or enter any other U.S. port facility to refuel.

Estimates of the wave conditions that would limit Port Dolphin operations were based on experience at existing offshore mooring buoy systems (see **Section 2.1.3**). A mooring monitoring system would be provided for real-time monitoring of all mooring cables and to provide warning of excessive or dangerous loads. The monitoring system would enable the Port operator and the Mooring Master to maintain safe and effective mooring tension and to provide vessel drift warnings. The mooring monitoring system would be integrated into the vessel's bridge operations.

Prior to departure, the Vessel or Mooring Master would make a security announcement to warn any and all vessels in the area that the SRV would soon depart. As the SRV prepares to exit Port Dolphin, the Vessel Master would evaluate weather conditions and identify the safest procedures and route for exiting the area.

Modern technology and vessel operating procedures combine to make commercial shipping very safe. The chance of a collision between an SRV and another vessel or structure is very unlikely. All practical and appropriate engineering and procedural means to minimize the chance of a collision or navigation accident associated with SRVs and support vessels would be developed, approved, and implemented with consideration of all applicable regulations and guidelines.

USCG has requirements for indicating the location of fixed structures on nautical charts and for lights, sound-producing devices, and radar reflectors to mark fixed structures and moored objects to help minimize the risk of collisions. In addition, the USCG's Local Notice to Mariners (monthly editions and weekly supplements) informs users of the offshore waters of western Florida about the addition or removal of locations of Aids to Navigation (ATONs) and defense operations involving temporary moorings.

The proposed Project vessels would follow prescribed routing procedures, as defined in the USCG-approved Operations Manual, when arriving and leaving Port Dolphin to avoid collisions and to minimize other potential impacts.

5.5.3.3 Extreme Weather

The area of the proposed and alternative location for Port Dolphin is subject to hurricanes and other tropical storms that can substantially influence regional currents, storm surges, and winds. Tropical storms (hurricanes) and extra-tropical storms (migratory cyclones and cold fronts) were evaluated for severe weather along the SRV transit and at the Port. Although the vessel at the buoy would be designed to withstand a 100-year storm, based on the analysis, a maximum wind speed of 23.9 m/s (78.4 feet per second), a wave height of 7.88 m (25.9 ft), and surface current speed of 72 cm/s (2.36 feet per second) were established as design criteria. Design specification for fixed equipment (e.g., STL buoys, anchors and chains, landing pad, PLEMs), risers were developed based on conservative safety factors for these extreme weather conditions (Port Dolphin 2007i).

If threatened by severe weather, any vessel at the Port would depart the Port in accordance with the requirements specified by USCG and in accordance with the USCG-approved Operations Manual. **Section 2.3.5** presents additional information on the parameters associated with the operations of Port Dolphin and weather and sea state conditions.

USCG would specify that the Applicant submit an Operations Manual and Facility Security Plan for approval by USCG and other appropriate authorities as a condition of the Maritime Administration License, if issued. The Operations Manual would include detailed SRV operating instructions for planned and unplanned Port closure scenarios. In addition, Port Dolphin would be required to have a plan in the USCG-approved Operations Manual to make decisions regarding hurricane evaluation and response criteria for specific weather conditions that require partial or total evacuation.

5.6 Pipeline Safety

5.6.1 Offshore Pipeline Safety Standards

Natural gas pipelines must be designed, constructed, operated, and maintained in accordance with the USDOT Minimum Federal Safety Standards (49 Part CFR 192 et seq.) and MMS requirements (30 CFR Part 250). The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. The regulations also specify material selection and qualification; integrity management; operator qualification; and pipeline protection from internal, external, and atmospheric corrosion.

Most of the pipeline associated with Port Dolphin would be offshore, and would be designed, constructed, and operated to meet or exceed the conditions of all applicable and appropriate regulations and guidelines as a condition of the Maritime Administration License, if approved. Pipe wall thickness and shutoff valve spacing would comply with applicable regulations and guidelines. Hydrostatic testing of the pipeline and risers would be performed in accordance with all applicable and appropriate regulations and guidelines. A cathodic protection system using sacrificial anodes would be installed to protect the pipeline from external corrosion.

Applicable regulations might require an approved Operation and Maintenance Plan that includes the following provisions:

- Employees would be trained and qualified to operate and maintain the pipeline system in accordance with all applicable and appropriate regulations and guidance.
- Operating procedures would address routine and emergency tasks as well as abnormal operating conditions.

- Periodic in-house refresher training classes would be required for operation and maintenance personnel to remain qualified in the performance of covered tasks and to respond properly to abnormal operating conditions and emergencies.
- Annual testing and inspection of pressure-limiting devices and ESD systems would be performed.
- The energy content and temperature of natural gas discharging into pipeline systems would be controlled in accordance with pipeline regulations.
- Inspections and flyovers of pipeline routes would be conducted at specified time intervals in accordance with the applicable and appropriate regulations and guidance.
- Development of corrosion control and integrity management plans.

The Maritime Administration License, if approved, would include appropriate conditions to ensure that design, construction, and operating requirements are incorporated for Port Dolphin, and that appropriate construction and operations training is developed and implemented.

5.6.2 Offshore Pipeline Incident Data

The data presented in **Table 5.6-1** provides a gas pipeline incident summary specific to offshore pipelines. On April 17, 2006, MMS published the Final Rule for Incident Reporting in the *Federal Register* (71 FR 19640-46) that revised the agency's incident reporting requirements. The new Incident Reporting Rule more clearly defines which incidents must be reported, broadens the scope to include incidents that have the potential to be serious, and requires the reporting of standard information for both oral and written reports. The goal of this final rule is to ensure consistent incident reporting and the collection of more reliable incident information.

Table 5.6-1. Offshore Natural Gas Pipeline Incident Summary

Incidents	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
GOM	7	13	2	7	7	11	8	9	8	6	0
Pacific	0	0	0	1	0	0	1	0	0	0	0
Total	**7**	**13**	**2**	**8**	**7**	**11**	**9**	**9**	**8**	**6**	**0**

Source: MMS 2009b
Note: Last Updated February 26, 2009

It should be noted that external corrosion is generally not considered a problem for offshore pipelines. The sacrificial anode system has been shown to provide successful lifetime protection against external corrosion (MMS 2000).

5.6.3 Offshore Third-Party Hazards

Offshore and onshore pipelines must be designed, constructed, operated, and maintained in accordance with applicable sections of 30 CFR Part 250, Subpart J and 49 CFR Part 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. Part 192 specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion. Damage from outside forces poses the greatest threat to pipeline safety. MMS requires subsea pipelines to be constructed and operated with specifications that minimize these outside forces. It is doubtful that subsea pipelines would pose a significant hazard to public safety or natural gas supply reliability.

During offshore operations, there is a remote possibility that the pipelines could be impacted, resulting in a loss of natural gas. The proposed deepwater Port connection is designed with check valves at interconnects and would shut down in the event of an emergency. It is unlikely that a resultant fire would occur or cause significant damage, due to the need for an ignition source and because of the limited amount of fuel available to feed the fire. In the event of a collision and fire, Port Dolphin would commence ESD and evacuation procedures. Any fire that occurs would be confined to the general vicinity of the release and would be of limited duration (i.e., self-limited). The fire would have limited impact on the environment and, due to the lack of surrounding man-made features, would have a minimal impact on other facilities.

A rupture near the interconnection would result in a loss of natural gas from the pipeline. However, any significant damage would be unlikely from this type of event because natural gas would bubble to the surface and dissipate. A fire could develop above the water surface if a vessel in the area provides an ignition source. As in the case of the vessel collision scenario, Scenario 4, the resultant fire would be of short duration and would have limited impact on the environment.

The ATBA and NAA also would be designed to limit risk of damage to all Project and non-Project vessels. By restricting access within these areas, it is unlikely that an anchor or fishing net would snag the submerged proposed Project components.

5.6.4 Mitigation Measures

The Applicant would comply with all applicable laws and regulations designed to promote safety and security of Port Dolphin. The following requirements would enhance safety at Port Dolphin:

- Pursuant to the regulations of the DWPA, USCG is authorized to establish temporary and permanent mandatory Safety Zone around deepwater ports. In addition, an ATBA and NAA would be established at the request of the USCG to the IMO. The deepwater port license application does not, by itself, constitute such applications for these zones and areas.
- The Applicant would include in its Operations Manual specific requirements describing the staffing and procedures for vessel traffic management, including procedures for monitoring and communicating with vessels in the vicinity of the proposed deepwater Port.
- The Applicant would include in its Operations Manual specific procedures based on regulations for communicating with vessels and controlling vessel movements within the Safety Zones.
- The Applicant would include in its Operations Manual specific instructions requiring Port Dolphin personnel to broadcast an emergency call on appropriate frequencies of any release or potential release of LNG cargo from Port Dolphin.

5.7 Onshore Pipeline Safety

5.7.1 Onshore Natural Gas Pipeline Segment

By definition all components and equipment of a deepwater port are seaward of the high-water mark (33 U.S.C. 1502.9). The onshore segment of the proposed new natural gas pipeline from the high-tide line to the connection with onshore facilities would be subject to permitting by FERC. Through agreement with the USCG, FERC will rely on this EIS to satisfy the NEPA documentation required for their permit evaluation. While pipeline segments within coastal waters (to 4.8 km [3 mi] offshore) would not be subject to FERC permitting, the USCG would, where appropriate, adopt FERC guidance as the baseline for assessment of safety and reliability for the natural gas pipeline segment within coastal waters.

The transportation of natural gas by pipeline in proximity to the public involves some risk in the event of an accident and subsequent release of gas. The greatest hazard is a fire or explosion following a major pipeline rupture.

5.7.2 Safety Standards

The USDOT is mandated to provide pipeline safety under 49 U.S.C. 601. The Office of Pipeline Safety (OPS) within the Pipeline and Hazardous Material Safety Administration (PHMSA) administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. It develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards that set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety. PHMSA ensures that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the Federal, state, and local level. Section 5(a) of the Natural Gas Pipeline Safety Act provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing the Federal standards, while section 5(b) permits a state agency that does not qualify under section 5(a) to perform certain inspection and monitoring functions. A state may also act as a USDOT agent to inspect interstate facilities within its boundaries; however, the USDOT is responsible for enforcement action. The majority of the states have either 5(a) certifications or 5(b) agreements, while nine states act as interstate agents. The USDOT pipeline standards are published in 49 CFR Parts 190–199. 49 CFR Part 192 specifically addresses natural gas pipeline safety issues.

Under a Memorandum of Understanding (MOU) on Natural Gas Transportation Facilities (Memorandum) dated January 15, 1993, between the USDOT and FERC, the USDOT has the exclusive authority to promulgate Federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of FERC's regulations require that an applicant certify that it would design, install, inspect, test, construct, operate, replace, and maintain the facility for which a certificate is requested in accordance with Federal safety standards and plans for maintenance and inspection, or shall certify that it has been granted a waiver of the requirements of the safety standards by the USDOT in accordance with section 3(e) of the Natural Gas Pipeline Safety Act. FERC accepts this certification and does not impose additional safety standards other than the USDOT standards. If FERC becomes aware of an existing or potential safety problem, there is a provision in the MOU to promptly alert the USDOT. The MOU also provides for referring complaints and inquiries made by state and local governments and the general public involving safety matters related to pipelines under FERC's jurisdiction. FERC also participates as a member of the USDOT's Technical Pipeline Safety Standards Committee which determines if proposed safety regulations are reasonable, feasible, and practicable.

The pipeline and aboveground facilities associated with the proposed Port (see **Section 2.3**) in Port Manatee and Manatee County, Florida, must be designed, constructed, operated, and maintained in accordance with the USDOT Minimum Federal Safety Standards in 49 CFR Part 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. 49 CFR Part 192 specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

49 CFR Part 192 also defines area classifications, based on population density in the vicinity of the pipeline, and specifies more rigorous safety requirements for populated areas. The area classification is an area that extends 201 m (220 yards) on either side of the centerline of any continuous 1.6-km (1-mi) length of pipeline. The four area classifications are defined as follows:

- *Class 1:* Location with 10 or fewer buildings intended for human occupancy

- *Class 2:* Location with more than 10 but less than 46 buildings intended for human occupancy
- *Class 3:* Location with 46 or more buildings intended for human occupancy or where the pipeline lies within 91 m (100 yards) of any building, or a small well-defined outside area occupied by 20 or more people on at least 5 days a week for 10 weeks in any 12-month period
- *Class 4:* Location where buildings with four or more stories above ground are prevalent.

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. Pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches normal soil and 18 inches in consolidated rock. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil and 24 inches in consolidated rock. The proposed pipeline exceeds the minimum Class 1 requirements and would be installed with a minimum of 36 inches of cover in normal soil (Port Dolphin 2008b).

All pipelines installed in navigable rivers, streams, and harbors must have a minimum cover of 122 cm (48 inches) in soil or 61 cm (24 inches) in consolidated rock. Offshore pipelines constructed in less than 3.7 m (12 feet) of water, as measured from the mean low tide, must have a minimum cover of 91 cm (36 inches) in soil and 46 cm (18 inches) in consolidated rock. Area classifications 2, 3, and 4, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 91 cm (36 inches) in normal soil and 61 cm (24 inches) in consolidated rock. Offshore pipelines constructed in 3.7 to 61 m (12 to 200 feet) of water, as measured from the mean low tide, must be installed so that the top of the pipe is below the natural bottom unless the pipeline is protected by some other means such as a heavy concrete coating.

Class locations also specify the maximum distance to a sectionalizing block valve (e.g., 16 km [10.0 mi] in Class 1, 12 km [7.5 mi] in Class 2, 6.4 km [4.0 mi] in Class 3, and 4 km [2.5 mi] in Class 4). Pipe wall thickness and pipeline design pressures, hydrostatic test pressures, maximum allowable operating pressure, inspection and testing of welds and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas. Preliminary class locations for the proposed Port have been developed based on the relationship of the pipeline centerline to other nearby structures and man-made features.

If a subsequent increase in population density adjacent to the ROW indicates a change in class location for the pipeline, Port Dolphin would reduce the maximum allowable operating pressure or replace the segment with pipe of sufficient grade and wall thickness, if required, to comply with USDOT regulations for the new class location.

In 2002, Congress passed an act to strengthen the nation's pipeline safety laws. The Pipeline Safety Improvement Act of 2002 (HR 3609) was passed by Congress on November 15, 2002, and signed into law by the President in December 2002. No later than December 17, 2004, gas transmission operators were required to develop and follow a written integrity management program that contains all the elements described in 49 CFR 192.911 and addresses the risks on each covered transmission pipeline segment. Specifically, the law established an integrity management program which applies to all high consequence areas (HCAs). The USDOT (68 FR 69778, 69 FR 18228, and 69 FR 29903) defines HCAs as they relate to the different class zones, potential impact circles, or areas containing an identified site as defined in section 192.903 of the USDOT regulations.

OPS published a series of rules from August 6, 2002, to May 26, 2004 (69 FR 29903), that defines HCAs where a gas pipeline accident could do considerable harm to people and their property and requires an integrity management program to minimize the potential for an accident. This definition satisfies, in part,

the Congressional mandate in 49 U.S.C. 60109 for OPS to prescribe standards that establish criteria for identifying each gas pipeline facility in a high-density population area.

The HCAs can be defined in one of two ways. In the first method an HCA includes the following:

- Current Class 3 and Class 4 locations
- Any area in Class 1 or Class 2 where the potential impact radius[5] is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle[6]
- Any area in Class 1 or Class 2 where the potential impact circle includes an identified site[7]
- In the second method an HCA includes any area within a potential impact circle which contains 20 or more buildings intended for human occupancy, or an identified site.

Once a pipeline operator has determined the HCAs on its pipeline, it must apply the elements of its integrity management program to those segments of the pipeline within HCAs. The USDOT regulations specify the requirements for the integrity management plan at section 192.911. The Applicant has not identified any HCAs along the proposed pipeline route.

The pipeline integrity management rule for HCAs requires inspection of the entire pipeline in HCAs every 7 years.

49 CFR Part 192 prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. Under 49 CFR 192.615, each pipeline operator must also establish an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency. Key elements of the plan include procedures for the following:

- Receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters
- Establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response
- Emergency shutdown of system and safe restoration of service
- Making personnel, equipment, tools, and materials available at the scene of an emergency
- Protecting people first and then property, and making them safe from actual or potential hazards.

49 CFR Part 192 requires that each operator must establish and maintain liaison with appropriate fire, police, and public officials to learn the resources and responsibilities of each organization that might respond to a natural gas pipeline emergency, and to coordinate mutual assistance. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. The Applicant would provide the appropriate training to local emergency service personnel

[5] The potential impact radius is calculated as the product of 0.69 and the square root of the maximum allowable operating pressure (MAOP) of the pipeline in psi multiplied by the pipeline diameter in inches.

[6] The potential impact circle is a circle of radius equal to the potential impact radius.

[7] An identified site is an outside area or open structure that is occupied by 20 or more persons on at least 50 days in any 12-month period; a building that is occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12-month period; or a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate.

before the pipeline is placed in service. No additional specialized local fire protection equipment would be required to handle pipeline emergencies.

5.7.3 Pipeline Accident Data

Since February 9, 1970, 49 CFR Part 191 has required all operators of transmission and gathering systems to notify the USDOT of any reportable incident and to submit a report on Form F7100.2 within 20 days. Reportable incidents are defined as any leaks that cause the following:

- A death or personal injury requiring hospitalization
- Any segment of transmission line to be taken out of service
- Gas ignition
- Damage to the property of the operator, or others, or both, estimated at a total of $5,000 or more
- Immediate repair on a transmission line to be required
- Occurred while testing with gas or another medium
- Is significant in the judgment of the operator, even though it does not meet the above criteria.

The USDOT changed reporting requirements after June 1984 to reduce the amount of data collected. Since that date, operators must only report incidents that involve property damage of more than $50,000, injury, death, release of gas, or that are otherwise considered significant by the operator. **Table 5.7-1** presents a summary of incident data for the 1970 to 2005 period. The service incident data summarized in **Table 5.7-1** include pipeline failures of all magnitudes with widely varying consequences. Approximately two-thirds of the incidents were classified as leaks, and the remaining third was classified as ruptures, implying a more serious failure.

Table 5.7-1. Onshore Natural Gas Service Incidents by Cause

Incidents per 1,000 miles of Pipeline (percentage)		
Cause	**1970–1984**	**1986–2005**
Outside force	0.70 (53.8)	0.10 (38.5)
Corrosion	0.22 (16.9)	0.06 (23.1)
Construction or material defect	0.27 (20.8)	0.04 (15.4)
Other	0.11 (8.5)	0.06 (23.1)
Total	**1.30**	**0.26**

Source: FERC 2008

The 14.5-year period from 1970 through June 1984, which provides a larger universe of data and more basic report information than subsequent years, has been subject to detailed analysis, as discussed in the following section (Jones et al. 1986).

During the 14.5-year period, 5,862 service incidents were reported over the more than 300,000 total miles of natural gas transmission and gathering systems nationwide. Service incidents, defined as failures that occur during pipeline operation, have remained fairly constant over this period with no clear upward or downward trend in annual totals. In addition, 2,013 test failures were reported. Correction of test failures removed defects from the pipeline before operation.

The dominant incident cause was outside forces, constituting 53.8 percent of all service incidents. Outside forces incidents result from the encroachment of mechanical equipment such as bulldozers and backhoes; earth movements due to soil settlement, washouts, or geologic hazards; weather effects such as

winds, storms, and thermal strains; and willful damage. **Table 5.7-2** shows where human error was responsible for approximately 75 percent of incidents caused by outside forces during this time. Since April 1982, operators have been required to participate in "One Call" public utility programs in populated areas to minimize unauthorized excavation activities in the vicinity of pipelines. The "One Call" program is a service used by public utilities and some private sector companies (e.g., oil pipelines and cable television) to provide preconstruction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts. The 1986 through 2005 data show that the portion of incidents caused by outside forces has decreased to 38.5 percent.

Table 5.7-2. Incidents by Outside Forces (1970 to 1984)

Cause	Percent
Equipment operated by outside party	67.1
Equipment operated by or for an operator	7.3
Earth movement	13.3
Weather	10.8
Other	1.5

Source: OPS 2008

The frequency of service incidents is strongly dependent on pipeline age. While pipelines installed since 1950 exhibit a fairly constant level of service incident frequency, pipelines installed before that time have a significantly higher rate, partially due to corrosion. Older pipelines have a higher frequency of corrosion incidents, since corrosion is a time-dependent process. Further, new pipe generally uses more advanced coatings and cathodic protection to reduce corrosion potential.

Older pipelines have a higher frequency of outside forces incidents partly because their location might be less well-known and less well-marked than newer lines. In addition, the older pipelines contain a disproportionate number of smaller diameter pipelines, which have a greater rate of outside forces incidents. Small diameter pipelines are more easily crushed or broken by mechanical equipment or earth movements.

Table 5.7-3 clearly demonstrates the effectiveness of corrosion control in reducing the incidence of failures caused by external corrosion. The use of both an external protective coating and a cathodic protection system, required on all pipelines installed after July 1971, significantly reduces the rate of failure compared to just coated or cathodically protected pipe. The data show that bare, cathodically protected pipe actually has a higher corrosion rate than unprotected pipe. This anomaly reflects the retrofitting of cathodic protection to actively corroding spots on pipes.

Table 5.7-3. External Corrosion by Level of Control (1970 to 1984)

Corrosion Control	Incidents per 1,000 miles per year
Unprotected pipe	0.42
Cathodic protection only	0.97
Coated only	0.40
Coated and cathodic protection	0.11

Source: OPS 2003

The pipelines included in the data set in **Table 5.7-3** vary widely in terms of age, pipe diameter, and level of corrosion control. Each variable influences the incident frequency that might be expected for a specific segment of pipeline. **Table 5.7-4** indicates that downward trend in pipeline-related incidences over the past 20 years. The average annual fatalities that occurred on natural gas transmission and gathering lines from 1970 to 2005 have reduced by almost half. Fatalities between 1970 and June 1984 have been separated into employees and nonemployees, to better identify a fatality rate experienced by the general public. Of the nationwide average of 5.0, fatalities among the public averaged 2.6 per year over this period. The simplified reporting requirements in effect after June 1984 do not differentiate between employees and nonemployees. However, the data show that the total annual average for the period 1984 through 2005 decreased to 3.6 fatalities per year. Subtracting two major offshore incidents in 1989, which do not reflect the risk to the onshore public, yields a total annual rate of 2.8 fatalities per year for this period.

Table 5.7-4. Average Annual Fatalities at Natural Gas Transmission and Gathering Systems

Year	Employees	Nonemployees	Total
1970–June 1984 [a]	2.4	2.6	5.0
1985–2005 [a]	–	–	3.6
1985–2005 [a]	–	–	2.8 [b]

Sources: USDOT 2005, Jones et al. 1986

Notes:

a Employee/nonemployee breakdown not available after June 1984.

b. Without 18 offshore fatalities occurring in 1989—11 fatalities resulted from a fishing vessel striking an offshore pipeline and 7 fatalities resulted from explosion on an offshore production platform.

The nationwide totals of accidental fatalities from various man-made and natural hazards are listed in **Table 5.7-5** to provide a relative measure of the industrywide safety of natural gas pipelines. Direct comparisons between accident categories should be made cautiously, however, because individual exposures to hazards are not uniform among all categories. Nevertheless, the average 2.6 public fatalities per year is relatively small considering the more than 480,000 km (300,000 mi) of transmission and gathering lines in service nationwide. Furthermore, the fatality rate is approximately two orders of magnitude (100 times) lower than the fatalities from natural hazards such as lightning, tornados, floods, and earthquakes.

The available data show that natural gas pipelines continue to be a safe, reliable means of energy transportation. Based on approximately 480,000 km (300,000 mi) in service, the rate of public fatalities for the nationwide mix of transmission and gathering lines in service is 0.01 per year per 1,600 km (1,000 mi) of pipeline. Using this rate and based on the proposed 6.4 km (4 mi) of onshore natural gas pipeline and proposed lifespan of 30 years, the Port is not expected to result in a public fatality from an onshore pipeline accident.

Table 5.7-5. Nationwide Accidental Deaths

Type of Accident	Fatalities
Motor Vehicles	43,649
Falls	14,985
Poisoning	9,510
Fires and Burns	3,791
Drowning	3,488
Suffocation by ingested object (1985–1993 average)	3,206
Natural gas transmission pipeline (1994–2003 average) [a]	181
Hazardous liquid pipeline (1994–2003 average) [b]	27
Nonemployees only (1970–1984 average)	2.6
All Accidents	**90,523**

Source: Census Bureau 2000 (unless otherwise noted below)

Notes:

a. USDOT 2005

b. Jones et al. 1986

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6. Cumulative and Other Impacts

6.1 Introduction

CEQ defines cumulative impacts as the "impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts can also result from individually minor but collectively significant actions taking place over a period of time within a geographic area.

Port Dolphin would include the construction and operation of two natural gas unloading buoys, two 36-inch flow lines to transfer the natural gas to the transmission line, and the transmission line from the flow lines to the onshore connections in Manatee County, Florida. SRVs would transport LNG to the unloading buoys and vaporize LNG into natural gas for distribution. The Port Dolphin Project would result in water quality, geological resources, biological, air quality, and noise quality impacts on the west coast of Florida, 45 km (28 mi) southwest of Tampa Bay. There would also be socioeconomic, recreational, and transportation impacts.

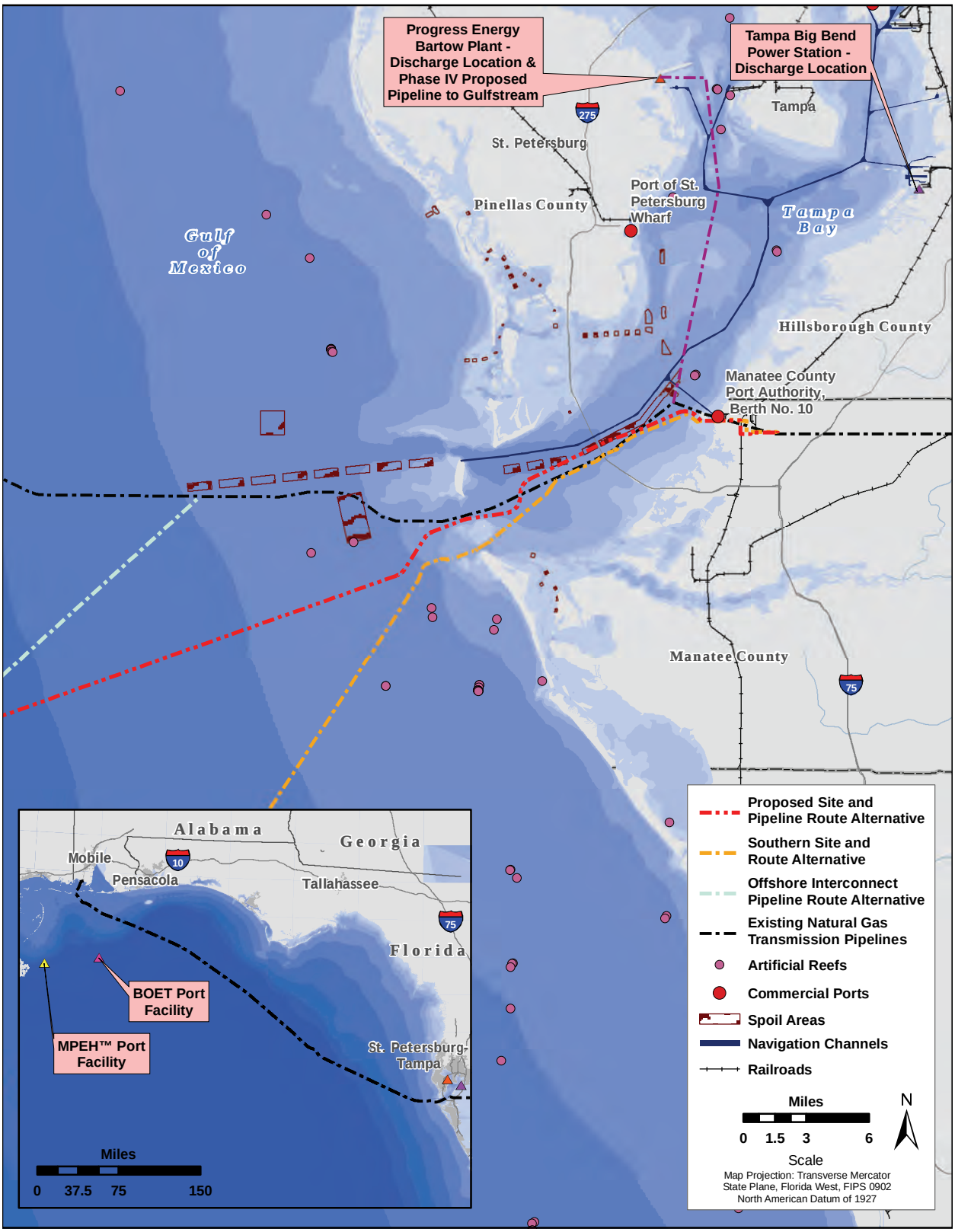
This cumulative impacts analysis summarizes expected environmental effects from the combined impacts of past, current, and reasonably foreseeable future projects within the geographic study area. The geographic study area used for the cumulative impacts analysis of the Port Dolphin project is characterized by three geographical boundaries: Tampa Bay, the west coast of Florida, and the northeastern GOM. **Figure 6.1-1** shows the current and future projects identified for Tampa Bay, the west coast of Florida, and the northeastern GOM. The northeastern GOM boundary was chosen so that the cumulative impacts analysis would include two similar deepwater port projects (see **Table 6.2-1**). Projects and programs considered for this analysis were identified through consultation with local governments, state and Federal agencies, company news releases, and published media reports. Projects with similar impacts were identified and generally include offshore, nearshore, or onshore commercial and resource agency activities. In Tampa Bay, west coast of Florida, and the northeastern GOM, projects with similar impacts generally include nearshore and deepwater port construction, offshore mineral and oil leases in the OCS, resource agency operations, and onshore residential and commercial development.

6.1.1 Framework for Assessing Cumulative Impacts

The cumulative impacts analysis focuses on the resource rather than the planned action and considers impacts that take place in both space and time. For the purposes of assessing the potential cumulative effects on natural resources and activities in the marine environment for this and other projects, both within and outside the Project area, the timeline for the construction and operation of the Port Dolphin project was taken into consideration. The timeframe for the Port Dolphin project is estimated at 25 years, with construction activities scheduled to start in August 2010 and be complete in June 2011. Offshore pipeline construction would be scheduled to take 9 or 10 months. Installation of the STL subsea system is scheduled to take 3 to 4 months. Onshore pipeline construction is expected to take 5 months, and interconnections with the existing pipelines would take an additional 2 to 3 months (Port Dolphin 2007a).

The general approach taken for cumulative impacts analysis in this EIS is as follows:

- Define other past, present, and reasonably foreseeable activities that could impact resources within the ROI of Port Dolphin (see **Section 6.2**)
- Assess whether impacts from Port Dolphin overlap impacts (in time and space) from other activities, potentially creating cumulative impacts



Source of Proposed Project Sites, Power Plants, and Port Facilities: e²M, Inc. 2007. Source of Proposed Pipeline: Gulfstream Natural Gas System, LLC 2006. Source of Spoil Areas: ConShelf 2007. Source of Artifical Reefs: FDEP 2007.

Figure 6.1-1. Present and Proposed Projects in Tampa Bay and the Northeastern Gulf of Mexico

- Total the impacts from Port Dolphin with other similar impacts, if impacts are additive and if quantitative information is available, or make a qualitative assessment of total impacts
- Estimate Port Dolphin's incremental contribution to total (cumulative) impacts (as a percentage of total, if quantitative)
- Assign an impact duration (short- or long-term) and an impact descriptor (minor, moderate, or major) to Port Dolphin's contributions to cumulative impacts and discuss whether an impact is adverse or beneficial to the resource
- Review mitigation measures identified throughout **Section 4.11** (BMPs, Mitigation and Minimization Measures, and Monitoring) for their effectiveness in reducing cumulative impacts and identify further mitigation measures designed to specifically reduce cumulative impacts, where possible.

6.1.2 Organization of Cumulative Impacts Chapter

Section 6.2 discusses the past, present, and reasonably foreseeable cumulative actions, as defined by CEQ. These are organized by type of projects (e.g., LNG projects, pipeline projects). **Section 6.3** includes the cumulative impacts analysis related to past, present, and reasonably foreseeable actions for those resources that would be adversely impacted by the construction and operations of Port Dolphin. Cumulative impacts on resources are summarized in **Table 6.3-1**. **Section 6.4** presents unavoidable impacts for each resource area and **Section 6.5** introduces the irreversible and irretrievable commitment of resources. The relationship between short-term uses and long-term productivity is discussed in **Section 6.6**.

6.2 Past, Present, and Reasonably Foreseeable Cumulative Actions

6.2.1 LNG Projects

LNG projects that could contribute to cumulative impacts within the geographical study area are discussed in this section. There are five operational LNG terminals in the United States. Two of these operational terminals are located in the GOM. Lake Charles LNG terminal is in Louisiana, and is licensed through FERC. The Gulf Gateway Energy Bridge is an offshore LNG terminal in West Cameron Block 603 of the GOM. In addition to these constructed and operational LNG terminals, licenses have also been approved by the Maritime Administrator for Port Pelican deepwater port, the Gulf Landing deepwater port, and the MPEH™ deepwater port. MPEH™ would be located in Main Pass Block 299, off the coast of Louisiana. The sponsors of the MPEH™ project are currently seeking external financing. Port Pelican and Gulf Landing have been indefinitely delayed by the applicants. A new proposal for a deepwater port LNG terminal in the GOM is anticipated in the summer of 2009. If approved and constructed, the Bienville Offshore Energy Terminal (BOET) would be located in Main Pass Block 258 off the shore of Alabama. The original BOET application was withdrawn in October 2008 while the applicant revised the design utilizing a closed-loop regasification system. The FERC has also approved two additional onshore LNG terminals in the Pascagoula, Mississippi, area.

The projects that could include impacts cumulative to Port Dolphin are presented in **Figure 6.1-1** and **Table 6.2-1**. The USCG and Maritime Administration have also received informal inquiries concerning application procedures for other deepwater ports for natural gas; however, this evaluation would include those deepwater port applications of which the USCG is aware[1].

[1] The USCG declines to speculate on where additional deepwater ports for natural gas might be located, what technologies they might employ, or whether inquiries that have been made to date will, in fact, result in license applications.

Table 6.2-1. Existing and Proposed LNG Terminals Within the Geographic Study Area

Project	Project Type	Project Location	Permitting Status	Distance from Port Dolphin (estimated)
Lake Charles, LA	Onshore LNG Terminal 2.1 bcfd	Lake Charles, LA	Operational	637 mi
Bayou Cassotte Energy, LLC, MS	Onshore LNG Terminal 1.3 bcfd	Pascagoula, MS	Approved by FERC	380 mi
Gulf LNG Clean Energy, LLC, MS	Onshore ONG Terminal 1.5 bcfd	Pascagoula, MS	Approved by FERC	380 mi
BOET LNG (TORP)	Deepwater Port 1.4 bcfd submerged turret loading system	GOM, Main Pass Block 258	Application withdrawn on October 9, 2008	319 mi
MPEH™	Deepwater Port 1.0 bcfsd, reuse of existing platforms plus new platforms	GOM, Main Pass Block 299	Application approved January 3, 2007	362 mi

Sources: FERC 2008a; MARAD 2008a, 2008b; USDOT 2007

Impacts on the GOM and Florida as a whole are also assessed where appropriate. All proposed LNG facilities were considered, but only those relevant to the resource in question were addressed in the cumulative impacts assessment. Facilities west of the Mississippi River were considered outside of the range of influence for assessment of cumulative impacts; therefore, LNG facilities west of the Mississippi are not considered to have cumulative impacts on the Proposed Project. Using these criteria and the geographic location of ports east or west of the Mississippi River discharge plume, the assessment of cumulative impacts associated with the Port Dolphin project would include the MPEH™ and BOET project proposed for the northeastern GOM. Both the Bayou Cassote Energy and the Gulf Clean Energy terminals are more than 600 km (375 mi) northwest of the Port Dolphin terminal in coastal waters. Due to the distance between the terminals, current movement between coastal and Federal waters, and meteorology, it would be rare that impacts between Port Dolphin and the two Pascagoula terminals would ever overlap. Therefore, the following LNG terminals will be considered when evaluating cumulative impacts.

- MPEH™ would be approximately 25.7 km (16 mi) southeast of the coast of Louisiana in Main Pass Block 299 in a water depth of approximately 64 m (210 feet). MPEH™ would provide a peak capacity of 1.0 bcfd. MPEH™'s major components would include four existing platforms, two new platforms, five natural gas takeaway pipelines, and natural gas liquids pipeline. The proposed natural gas pipelines would connect to the interstate pipeline system off- and onshore. The natural gas liquids pipeline fractionating facility is located in Venice, Louisiana.
- BOET would be approximately 101 km (63 mi) south of Fort Morgan, Alabama, in Main Pass Block 258 in a water depth of approximately 130 m (425 feet). BOET would provide a peak capacity of 1.4 bcfd of natural gas. BOET's major components would include a support platform, two HiLoad LNG regasification units to receive and regasify LNG and parking systems for the HiLoad units, and four offshore gas pipelines totaling 39.8 km (22.7 mi) long. The interconnect pipelines would connect with existing natural gas pipelines on the OCS.

Table 6.2-2 shows the time and spatial comparison of the proposed GOM deepwater ports to assess whether impacts from Port Dolphin overlap impacts (in time and space) from activities at these LNG terminals.

Table 6.2-2. Time and Spatial Comparison of the Proposed GOM Deepwater Ports

Deepwater Port	Construction Period	Operation Period	Distance Direction to Port Dolphin	Distance Direction to MPEH™	Distance Direction to BOET	Distance Offshore Miles	Depth of Water Feet
Port Dolphin	11 months	Estimated to begin mid 2011, lasting for 20 years	---	363 mi SW	319 mi SW	28 [a]	100
MPEH™	48 months	Estimated to begin 2011, lasting for 30 years [a]	363 mi NE	---	48 mi W	16 [a]	210 [a]
BOET	7 months	Estimated to begin 2013, lasting for 25 years [b]	319 mi NE	48 mi E	---	63 [c]	425 [c]

Sources: a. USCG and MARAD 2006, b. LNG Unlimited 2009, c. USCG and MARAD 2005

6.2.2 Pipeline Projects

In 2001, Gulfstream Natural Gas System LLC completed a 419-mi-long, 36-inch-diameter offshore pipeline between Mobile Bay, Alabama, and Tampa Bay, Florida. The Gulfstream EIS estimated that the pipeline would cross approximately 28.7 miles of live-bottom area and 3.5 miles of forested wetlands when constructed (FERC 2001b). The Florida Gas Transmission Company Bayside Lateral EIS estimated short-term adverse impacts from construction on forestlands to be 26.3 acres, and long-term adverse impacts on forestlands to be 10.6 acres during the operation of the pipeline (FERC 2001a). Gulfstream is currently proposing to construct approximately 18 mi of 20-inch offshore pipeline from a proposed underwater hot tap with the existing Gulfstream pipeline in the Hillsborough County waters of Tampa Bay and connecting to the existing Progress Energy Bartow Power Plant on the eastern shore of St. Petersburg, Florida, in Pinellas County (USEPA 2006).

There are two proposed onshore pipeline projects that could have an added impact along with the onshore portion of the Proposed Action. The St. Petersburg Relay Replacement Project and the Phase VII Expansion Project are both located in the same geographical area as the onshore portion of the proposed Port Dolphin pipeline and interconnection facilities. These projects, in combination with the Proposed Action, could have a cumulative impact on resources. **Table 6.2-3** outlines the proposed natural gas pipelines in Florida that could have direct and indirect cumulative impacts on resources in the geographical area of cumulative impact.

There are several additional operational pipelines in the Tampa Bay area of Florida. There are three operating pipelines in Manatee County, Florida. These pipelines are operated by FPL, FTG, and Williams Transco (PHMSA 2007). Six pipelines, operated by Bayside Power Plant, Central Florida Pipeline Corporation, FGT, Tampa Bay Pipeline Company, Tampa Pipeline Limited Partnership, and William Gas Pipeline Transco, are operated in Hillsborough County. Two pipelines, operated by FGT and Florida Power Corporation are operated in Pinellas County (PHMSA 2007). **Table 6.2-4** outlines

operational pipelines in Tampa Bay, Florida. Construction of Port Dolphin could be additive to the operation and maintenance of these pipelines.

Table 6.2-3. Proposed Pipeline Projects in Tampa Bay Area, Florida

Project Name	Company	Activity Description
Phase VII Expansion Project	Florida Gas Transmission Company	Request for permission and authorization to construct, own, and operate certain pipeline facilities and additional compression to enable FGT to provide firm transportation services
St. Petersburg Relay Replacement Project	Florida Gas Transmission Company	FGT proposes to replace about 6.6 miles of its St. Petersburg 12-inch-diameter lateral pipeline in east-central Pinellas County, Florida

Source: USEPA 2006

Table 6.2-4. Operational Pipelines in the Tampa Bay Area, Florida

Project Name	Company	Activity Description
Gulfstream Pipeline	Gulfstream LLC	Proposal to construct approximately 18 mi of 20-inch offshore pipeline from a proposed underwater hot tap with the existing Gulfstream pipeline in the Hillsborough County waters of Tampa Bay and connecting to the existing Progress Energy Bartow Power Plant on the eastern shore of St. Petersburg, Florida, in Pinellas County.
Cypress Pipeline Project	Southern Natural Gas Company	Proposal to construct about 165 miles of mainline pipeline in Chatham, Effingham, Bryan, Liberty, Long, McIntosh, Glynn, Camden, and Charlton counties, Georgia; and Nassau, Duval, and Clay counties, Florida, about 10 miles of pipeline loop in Chatham and Effingham counties, Georgia; and three new compressor stations in Liberty County and Glynn County, Georgia, and Nassau County, Florida.
Florida Natural Gas Storage Project	Floridian Natural Gas Storage Company, LLC	The project would consist of a natural gas storage facility in Martin County, Florida, north of Indiantown, Florida, and two approximately 4-mile-long natural gas pipelines, extending northwest from the facility to interconnect with the existing interstate pipeline systems of Florida Gas Transmission and Gulfstream Natural Gas System, LLC.
Inglis Hydropower Project	Inglis Hydropower, LLC	The project would be located on the Withlacoochee River, in Levy County, Florida.
Martin Connector	Gulfstream Natural Gas System, L.L.C.	Proposal to construct a 4.98-mile-long pipeline in Martin County, Florida.
Phase III Pipeline Project	Gulfstream Natural Gas System, L.L.C.	Gulfstream proposes to construct, own, and operate a 34.3-mile segment of 30-inch gas pipeline extending from its existing Station 712 in Martin County, Florida, to a newly constructed station that would connect to the proposed FPL gas turbine West County Energy Center in Palm Beach County, Florida.

Project Name	Company	Activity Description
Phase VII Expansion Project	Florida Gas Transmission Company	Application to expand existing pipeline facilities between Jacksonville and Tampa, Florida. The expansion would consist primarily of 32 miles of looping pipeline and modifying compression at two existing compressor stations. This expansion is planned to transport new volumes of gas to be delivered into Florida by the Cypress Pipeline Project (PF05-7-000).
SR 91 Pipeline Relocation Project	Florida Gas Transmission Company	Approval to abandon certain mainline pipeline and to construct, modify, and operate mainline pipeline, valves, and ancillary facilities to replace a portion of mainline on the FGT East Leg to accommodate a widening project of State Road 91 in Broward County, Florida.
SR 91 Widening Project	Florida Gas Transmission Company	Proposal to replace/relocate about 13 miles of pipeline to resolve possible conflicts resulting from the widening of State Route 91 in Broward County, Florida.
Turkey Point Project	Florida Gas Transmission Company	Application to construct a new compressor station on an existing lateral on the grounds of the Turkey Point Power Plant in Miami-Dade County, Florida.

Source: USEPA 2006

6.2.3 Electrical Power Transmission Line Projects

There are two electrical power transmission line projects scheduled for completion in 2011 that could have an added impact along with the onshore portion of the Proposed Action. Power transmission lines are linear projects that can have similar impacts as pipeline projects due to the necessity of a corridor ROW and associated disturbances. **Table 6.2-5** outlines the proposed electric power transmission line projects in the project vicinity that could have direct and indirect cumulative impacts on resources in the geographical area of cumulative impact. The proposed corridors for the BobWhite-Manatee Line and the Lake Agnes-Gifford Line are approximately 10 miles and 70 miles, respectively, from the onshore portion of the Proposed Action.

Table 6.2-5. Proposed Electric Transmission Line Projects in Tampa Bay Area, Florida

Project Name	Company	Activity Description
BobWhite-Manatee 230-kV Line	Florida Power and Light	Proposed 25.5-mile-long line to connect the Manatee Energy Center near Parrish in Manatee County to a proposed new substation east of I-75 in Sarasota County. Approved by FDEP in November 2008.
Lake Agnes-Gifford 230kV Line	Progress Energy/Tampa Electric	Proposed 27.5-mile-line connecting Tampa Electric's existing Lake Agnes substation in Polk County to Progress Energy's planned Gifford Substation in Orange County. Siting Board hearing scheduled January 2009.

Source: FDEP 2008a

6.2.4 Sand Resources

6.2.4.1 Dredging

Dredging operations include sediment and gravel harvesting; pipeline installation; canal installation, maintenance, and modifications; harbor installation and maintenance; and stream channelization. The USACE dredges millions of cubic meters of material a year. Materials from maintenance dredging are primarily disposed on existing dredged-material disposal banks and in dredged-material disposal areas in Federal and state waters. Some dredge-material can be used in a beneficial manner such as wetland restoration projects, beach nourishment projects, and industrial and commercial development. Dredged material disposal results in temporarily increased turbidity and resuspension and can release sediment contaminants into coastal waters (MMS 2007). There are several dredged-material disposal areas in the vicinity of the Port Dolphin Project area.

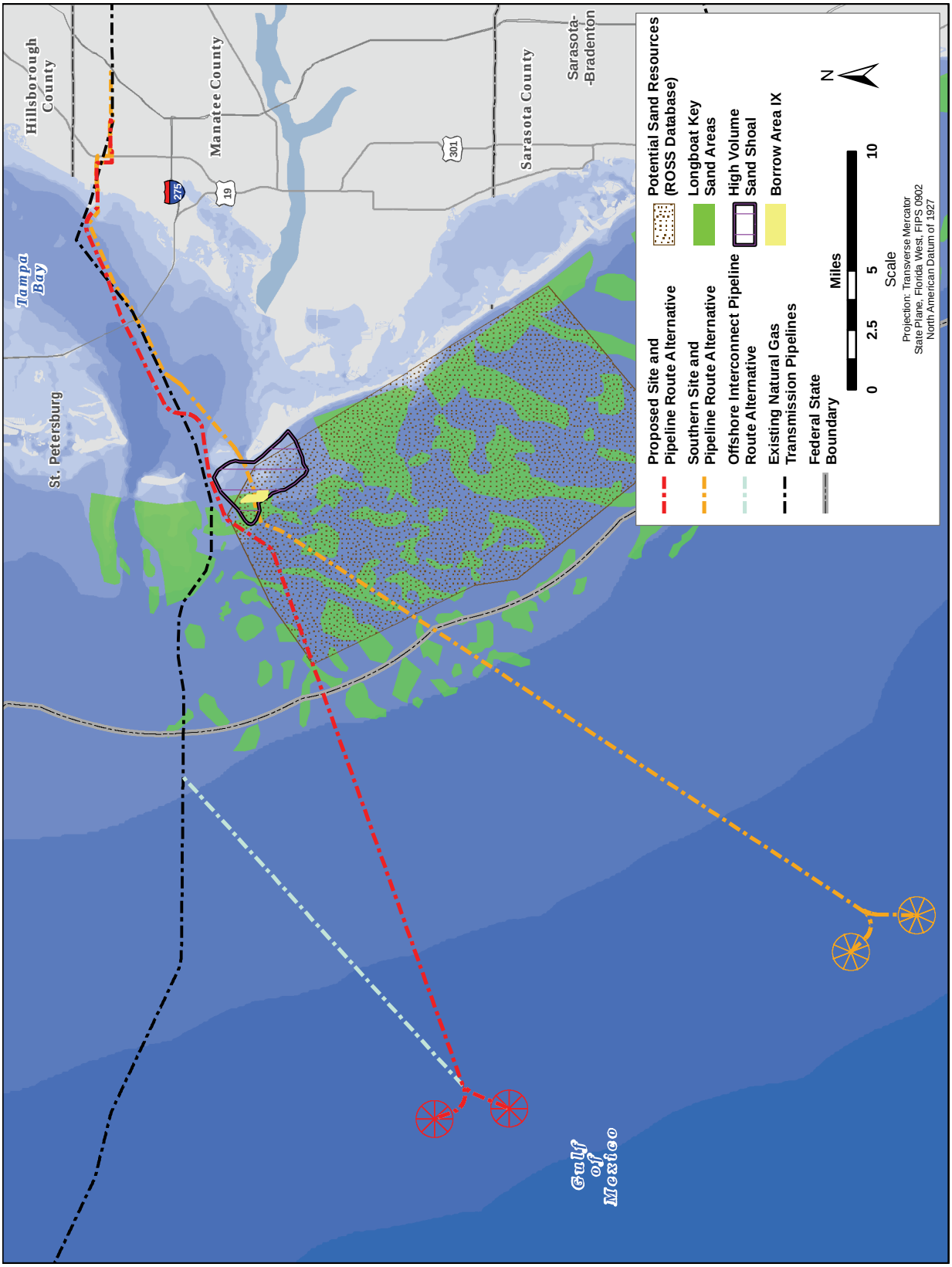
Currently, dredging to maintain the Tampa Bay's channels generates about a million cubic yards of material each year. Much of the sediment dredged during maintenance activities is deposited on two man-made spoil islands in Hillsborough Bay. Eventually these spoils would reach capacity and alternatives would be necessary to accommodate the nearly 30 million cubic yards that would be created through the year 2030. Options for increasing the capacity of these islands are being studied. USACE is also evaluating the need for additional passing and turning lanes, anchorage areas, creation of a loop channel, and several other navigational safety improvements to accommodate increased maritime commerce in Tampa Bay (TBEP 2006). A comprehensive maintenance and expansion-dredging program is underway at Port Manatee. The Port of St. Petersburg has been approved to initiate studies to widen and deepen the Port basin and approach channel. The Port of Tampa has recently completed the widening of a portion of Sparkman Channel to support larger cruise ship traffic (FSTEDC 2007).

6.2.4.2 Beach Nourishment Projects

Beach nourishment projects on the west coast of Florida are currently occurring in Pinellas County (i.e., Longboat Key and Egmont Key), Manatee County, Sarasota County, Charlotte County, and Lee County (TBW 2007). **Figure 6.2-1** shows existing and potential sand resources in the area used for beach nourishment projects. The existing and potential sand resources in the area would be used primarily by Longboat Key and Anna Maria Island. Beach nourishment projects within these two towns occur on varying time scales. Longboat Key's last major nourishment projects occurred in 1993, 1997, and 2006 and the average volume of sand was 1,529,100 m^3 (2,000,000 y^3). According to Longboat Key's beach management plan the next major nourishment is scheduled for 2014. Anna Maria Island conducted beach nourishment projects in 1993, 2002, and 2006. The average volume of sand used for each of Anna Maria Island's projects was 1,150,000 m^3 (1,500,000 y^3). The Applicant has rerouted the pipeline to avoid mapped and active sand resources to the extent applicable. The volume of sand restricted by the proposed pipeline represent 0.06 percent of all mapped potential sand resource areas, and completely avoids Borrow Area IX and the High Volume Sand Shoal Area. This represents a minute proportion of sand and impacts to the potential sand resource would be expected to be minor, long-term and adverse.

6.2.5 Oil and Gas Leasing/Mineral Leasing

There are no active oil and gas platforms near the location proposed for the Port Dolphin project. On December 20, 2006, President Bush signed into law the Gulf of Mexico Energy Security Act (GOMESA), which makes available two new areas in the GOM for leasing (the Lease Sale 224 and the "181 South" Areas). One oil and gas lease sale, within an area previously known as the "181 Area," is scheduled for



Source of Proposed Piplines, Florida Gas Transmission Pipeline, and Existing Sand Resources: ConShelf 2007. Source of ROSS Potential Sand Source Area: ConShelf 2008. Source of Borrow Area IX and High Volume Sand Shoal: ConShelf 2009.

Figure 6.2-1. Existing and Potential Sand Resources in Tampa Bay, Florida

the Eastern Planning Area. Lease Sale 224 offered all blocks in the proposed lease sale area that could contain economically recoverable oil and gas via one lease sale, as authorized under GOMESA. Lease Sale 224 was held on March 19, 2008, in New Orleans, Louisiana. The MMS received 58 bids from six companies on 36 tracts, resulting in $64,713,213 in high bids. This oil and gas lease sale falls within the boundaries of this cumulative impact assessment.

The MMS prepared and disseminated to the public the Gulf of Mexico OCS Oil and Gas Lease Sale 224: Eastern Planning Area, Final Supplemental Environmental Impact Statement (EIS) (MMS 2007). The GOMESA also establishes a moratorium on leasing, preleasing, and other activities in the following areas until June 30, 2022:

- The area within 201.17 km (125 mi) of the State of Florida in the MMS Eastern Planning Area
- The 181 Area in the MMS Central Planning Area that is within 160.93 km (100 mi) of the State of Florida
- The area east of the Military Mission Line.

In April 2007, the MMS prepared an EIS entitled *Gulf of Mexico OCS Oil and Gas Lease Sales: 2007–2012* (MMS 2007). The EIS evaluated five lease sales in the Western Planning Area and six lease sales in the Central Planning Area that are expected to occur through 2012. Its discussions take into account a wide variety of activities that flow from OCS leases: exploration, pipeline and platform construction, emplacement and removal, oil and gas production operations including use of the support vessels and helicopters, and ship transit and anchoring. The eastern portion of the Central Planning area falls within the boundary for this cumulative impacts assessment. Additionally, many of the activities associated with the lease sales could result in indirect or direct cumulative impacts with the Proposed Action.

The MMS EIS for oil and gas lease sales includes offshore scenario information related to OCS Program activities in the GOM for the years 2007 to 2046. The MMS estimates that as of September 2006 there were 3,350 active offshore platforms. Presently and over the next 20 years, in comparison to other structure-based activities in the OCS (and based on known applications for future deepwater ports), there would be a substantially smaller number of LNG terminals in the GOM. In addition, adding these deepwater ports to the inventory of offshore facilities, would not affect the MMS estimates of GOM-wide activities. The Louisiana Offshore Oil Port (LOOP), permitted in 1977, was the first deepwater port and remains the only crude oil deepwater port. The LOOP is approximately 18 miles south of Leeville and Grand Isle, Louisiana, in 110 feet of water. Ultra-large crude carriers and very large crude carriers transport crude oil from around the world to the LOOP, where it is offloaded and piped to Fourchon, Louisiana, then to Clovelly Terminal.

6.2.6 Cooling Water Withdrawals and Discharges

Two projects in the Tampa Bay area would impact cooling water withdrawals and discharges. Tampa Electric's Big Bend Power Station withdraws and discharges 1.4 billion gallons per day of seawater from Tampa Bay. The Tampa Bay Seawater Desalination Plant, the largest water desalination plant in North America, works in conjunction with the Big Bend Power Station. It is designed to "catch" approximately 44 MGD of warm seawater and separate it into drinking water and concentrated seawater (TBW 2008). The plant returns the concentrated seawater to Big Bend's cooling water stream where it is mixed with approximately 1.4 billion gallons of cooling water from Big Bend to be diluted at a concentration of 70 to 1. The water is discharged at a salinity that is 1.0 to 1.5 percent higher than ambient Tampa Bay water (within Tampa Bay's normal, seasonal fluctuation). The Tampa Bay Seawater Desalination Plant is an integral part of the Tampa Bay region's drinking water supply. The plant began producing water in March 2003 and operated intermittently through May 2005, supplying nearly 5 billion gallons of fresh

drinking water to the regional system. Remediation construction was completed in spring 2007. The plant is now fully operational, providing 25 MGD of fresh drinking water daily (TBW 2008). Progress Energy's upgrade of the Bartow Plant is now 90 percent complete, and could also result in cooling water withdrawal and discharge from Tampa Bay (Progress Energy 2008). The plant began producing water in March 2003 and operated intermittently through May 2005, supplying nearly 5 billion gallons of fresh drinking water to the regional system. The desalination plant is off-line while deficiencies in the design and construction of the pretreatment and intake processes, and the reverse osmosis and intake processes, are being fixed. No expansion of the generating capacity at the Big Bend Power Station is proposed (MMS 2007).

Progress Energy's proposal to repower the Bartow Station Power Plant could also result in cooling water withdrawal and discharge from Tampa Bay. The repowering of Bartow Station in Pinellas County entails the addition of a natural gas-fired simple cycle unit and a natural gas-fired combined cycle unit, with total generating capacity of 1,475 megawatts (FDEP 2008c). Water withdrawal numbers are unknown at this time.

6.2.7 Area Fisheries Restrictions

The GMFMC is one of eight regional fishery management councils established by the MSFCMA, for the purpose of managing fisheries in the EEZ of the GOM. The GMFMC has developed seven FMPs that manage 55 species of fish and invertebrates plus the coral complex (see **Section 3.2.9**). Overfishing is occurring on four reef fish species: red snapper, greater amberjack, gag, and gray triggerfish. Overfishing occurs when more fish are being taken from a stock than the fish population can replace through reproduction or immigration from other populations. A species is declared overfished when the population size is below a certain level determined by scientists to be healthy (TBEP 2006, GMFMC 2004). The red snapper stock is in the seventh year of a 31-year rebuilding schedule (NMFS 2008). The greater amberjack stock is projected to be rebuilt in 2010 (GMFMC 2008). The rebuilding schedule for the gag stock is undefined (NMFS 2008). The gray triggerfish stock is projected to be rebuilt in 2017 (GMFMC 2008). In order for these stocks to recover, mortality needs to be reduced (NMFS 2008).

Other activities that could result in impacts on fisheries resources and EFH include overfishing, habitat degradation caused by commercial and recreational fishing, and a general degradation of water quality. Specific activities in Tampa Bay that have an adverse impact on fisheries resources include project installation, cooling water intakes and discharges, other effluent discharge, loss of trash and debris from vessels, vessel traffic, shipping, commercial and recreational fishing, and seawater intake for cooling and warming purposes.

The GMFMC has established two gear-restricted areas to protect species managed under the Reef Fish FMP. The Reef Fish Stressed Area was originally established by the GMFMC to help rebuild overfished reef fish. The Reef Fish Stressed Area is that part of the GOM EEZ shoreward of a rhumb line (a line crossing all meridians at the same angle, i.e. a path of constant bearing) (50 CFR 622.34). The use of fish traps, roller trawls (e.g., rock hopper trawl), and powerheads (e.g., a spear gun shaft with a fire arm ammunition replacing the spearhead) is prohibited in this part of the EEZ to reduce fishing pressure on snapper and grouper species. The Reef Fish Longline/Buoy Gear area was established by the GMFMC to protect the larger red snapper spawning population. The use of long lines and buoy gear are prohibited inshore of 20 fathoms in Florida and inshore of 50 fathoms for the remainder of the GOM (see **Section 3.2.3.3** and **Figure 3.2-1**) (GMFMC 2004).

The FWC, Division of Marine Fisheries (DMF) is the state agency for managing commercial and recreational marine fisheries in Florida. The DMF's Bureau of Marine Fisheries Management administers a state artificial reef program to provide financial and technical assistance to coastal local governments,

nonprofit corporations, and state universities to develop artificial reefs and to monitor and evaluate these reefs. Under the program, reefs have been constructed with one or more of the following intended objectives: (1) enhance private recreational and charter fishing and diving opportunities; (2) provide a socioeconomic benefit to local coastal communities; (3) increase reef fish habitat; (4) reduce user conflicts; (5) facilitate reef-related research; and, (6) while accomplishing objectives 1 to 5, do no harm to fishery resources, EFH, or human health. Other reef-building objectives undertaken in Florida but outside this agency include mitigation or restoration reefs to replace hard-bottom habitat lost through such activities as beach renourishment (MMS 2007).

6.2.8 Onshore Residential and Commercial Construction

The Taylor Woodrow Community of Artisan Lakes, LLC, has plans to develop the Artisan Lakes Community in Manatee County, Florida. This area would be adjacent to the FPL and Gulfstream easements. Construction of the community could overlap with construction of the onshore pipeline causing additional impacts on transportation and community infrastructure**.**

The population in Tampa Bay is expected to grow approximately 19 percent by the year 2015 (TBEP 2006). Population increases and development in the Tampa Bay region are related to the major shipping centers and the associated commercial and recreational activities (USEPA 2006). The effects of the population growth, development, and other commercial and recreational activities (such as commercial and recreational fishing) could result in direct and indirect coastal and offshore cumulative impacts with the Proposed Action.

6.3 Overview of Cumulative Impacts Analysis

This section will evaluate resource-specific impacts related to the past, present, and reasonably foreseeable actions discussed in **Section 6.2**. Only those actions that are in addition to the construction or operation impacts associated with Port Dolphin project are considered. **Table 6.3-1** summarizes potential cumulative impacts on resources from the Proposed Action when combined with other past, present, and future activities. The cumulative impacts analysis is discussed in more detail in the following sections.

6.3.1 Water Quality

Incremental contribution to cumulative impacts on water quality from past and ongoing actions in Tampa Bay would be expected from: vessel operations, industrial discharges, dredged material placement, sand harvesting, pipeline construction, sewage, agriculture runoff, and historic and current fishing activities. Foreseeable future actions would include additional natural gas pipelines and offshore pipelines, as well as population growth and coastal development in the Tampa Bay area. Foreseeable future port and pipeline installation activities that would occur within the construction and operation timeline of Port Dolphin would combine with other past and ongoing discharges to Tampa Bay waters to produce minor, short-term adverse incremental contribution to cumulative impacts on water quality. Although the BOET and MPEH™ deepwater LNG ports may be constructed and operated during the same timeframe as Port Dolphin, no overlap of impacts from construction or operation are anticipated due to the spatial separation between the ports (see **Table 6.2-2**). During the installation of the Port and offshore pipeline, construction and support vessels would traverse coastal and marine waters creating discharges from bilge waters, treated sanitary wastes, and engine cooling waters. All discharges would comply with applicable Federal and state water quality standards (see **Section 3.1.3.3**). No release of free oil would occur. Anchoring of construction vessels and pipeline jetting and plowing activities would create turbidity in the water column resulting in sediment displacement. The contribution to cumulative impacts on water

Table 6.3-1. Summary of Cumulative Impacts by Resource Areas

	Resource	Past Actions	Current Actions	Proposed Action and Alternatives	Foreseeable Future Actions
Water Quality	Vessel operations, agricultural runoff, and industrial and cooling water discharges have impacted Tampa Bay and GOM water quality.	Vessel operations, agricultural runoff, and industrial and cooling water discharges impact Tampa Bay and GOM water quality.	Port and pipeline installation, cooling water discharges, pipeline integrity testing, SRVs. Cumulative impacts for the alternatives are similar.	Oil and gas production, vessels, onshore cooling water intake and discharges, dredging. MPEH™ and BOET in northeastern GOM. Potential for additional LNG Terminals. Future offshore pipelines. Population growth and coastal development in Tampa Bay area.	Current and future activities would impact Tampa Bay, coastal, and marine waters. LNG terminals would have minor, short- and long-term adverse incremental contribution to cumulative impacts on water quality.
Biological Resources	Vessel operations, onshore cooling water and industrial discharges, dredging and channelization, and offshore vessel discharges resulting in degraded historic habitat of sensitive and common wildlife species and degraded water quality for sensitive species. Stresses to GOM fisheries may also have occurred as a result of overfishing of certain species.	Vessel operations, onshore cooling water, and discharges continue to impact biological resources and wildlife habitat.	Port and pipeline installation, cooling and ballast water intake, cooling water discharges, pipeline integrity testing, SRVs. Cumulative impacts for the alternatives are similar, with the exception of marine protected resources and benthic resources where the Offshore Interconnection with the Gulfstream Pipeline Alternative would have a lesser contribution to cumulative impacts due to lesser disturbance of the ocean bottom.	Vessel operations, onshore cooling water intake and discharges, dredging, and fishing. Potential for additional LNG Terminals. Population growth and coastal development in Tampa Bay area.	Current and future activities would have short- and long-term minor adverse cumulative impacts on wildlife and threatened and endangered species as a result of temporary noise disturbances.

	Resource	Past Actions	Current Actions	Proposed Action and Alternatives	Foreseeable Future Actions
Cultural Resources	Any past land disturbance activity could have resulted in destruction of unknown artifacts.	Current land disturbance activities not likely to destroy artifacts due to the protections afforded by NHPA compliance.	None anticipated through mitigation by avoidance.	Future land disturbance activities not likely to destroy artifacts due to the protections afforded by NHPA compliance.	None anticipated through mitigation by avoidance.
Geological Resources	Installation of pipelines and structures on the OCS. Dredging of shipping channels. Beach nourishment projects.	Oil and gas production, installation of pipelines and structures on the OCS. Dredging of shipping channels. Beach nourishment projects.	Installation of pipelines and structures. Cumulative impacts for the Southern Site and Pipeline Alternative would be greater than the Proposed Alternative, but lesser for the Offshore Interconnection with the Gulfstream Pipeline Alternative.	Oil and gas production, installation of pipelines and structures on the OCS. Dredging of shipping channels. Beach nourishment projects.	Current and future activities would have long-term minor adverse cumulative impacts on undisturbed soils for onshore pipeline construction. Short- and long-term minor cumulative impacts on geological resources would occur as a result of installing the port and offshore pipeline.
Marine Areas and Land Use	Oil and gas production activities and shipping on the OCS. Pipeline and ancillary facility construction in Florida.	Oil and gas production activities and shipping on the OCS. Pipeline and ancillary facility construction in Florida.	Long-term change in land use along the onshore ROW. Consistent land use in the OCS. Cumulative impacts for the alternatives are similar.	Proposed onshore pipelines in counties surrounding Tampa Bay. Population growth and coastal development in Tampa Bay area.	Population growth and coastal development. Construction of onshore pipelines; minor localized cumulative effects. Cumulative impacts on the OCS would be short-term minor adverse.

	Resource	Past Actions	Current Actions	Proposed Action and Alternatives	Foreseeable Future Actions
Recreation and Aesthetics	Transient commercial and recreational vessels became temporary visual interruptions.	Transient commercial and recreational vessels are temporary visual interruptions.	Constant static visual interruption at fixed points up to 2 miles. Cumulative impacts for the alternatives are similar.	Future residential development in the area might be affected by permanent clearing of onshore pipeline ROW.	Cumulative impacts on visual resources would be long-term, minor, direct and adverse
Air Quality	Emissions from offshore activities, cargo and other vessels degraded regional air quality. Power plants, factories, vehicles, and other onshore emissions sources degraded regional air quality.	Existing emissions sources continue to adversely affect regional air quality.	SRVs, support vessels, and Port equipment would have small contribution to emissions and small adverse impact on air quality. Cumulative impacts for the alternatives are similar.	Population growth and coastal development such as factories will lead to more vehicles and more demand for electrical power (but future sources will be cleaner).	Current activities would be the dominant source of emissions. Port construction and pipe-laying activities would cause minor, short-term localized impacts on air quality for the duration of construction activity.
Noise	Ships and oil and gas production became dominant offshore noise sources. Development, cars, and helicopters became dominant onshore noise sources.	Ships and oil and gas production are dominant offshore noise sources. Development, cars, and helicopters are dominant onshore noise sources.	Short-term noise from construction activities; additional noise from increased traffic and offshore operations. Cumulative impacts for the alternatives are similar.	Ships and oil and gas production would continue to be dominant offshore noise sources. Development, cars, and helicopters would be dominant onshore noise sources.	Current activities would be the dominant noise source. Cumulative impacts would be short-term, minor adverse.

	Resource	Past Actions	Current Actions	Proposed Action and Alternatives	Foreseeable Future Actions
Socioeconomics and Environmental Justice	Oil and gas development along the Gulf Coast and the OCS. Development of local economic bases.	Oil and gas development, LNG import terminals, shipping ports, and fishing industries support of local economies.	Minor contribution to local construction, and oil and gas support industries. Cumulative impacts for the alternatives are similar.	Existing industries would support local economies.	Minor stimulation of local economies from construction activities. Localized, minor environmental justice impacts from creation of pipeline ROWs.
Navigation and Transportation	Cargo vessels, fishing ships, and oil and gas platforms and service vessels travel the GOM.	Cargo vessels, fishing ships, and oil and gas platforms and service vessels travel the GOM.	LNGCs and service vessels would add to ship traffic in GOM. Cumulative impacts for the alternatives are similar.	MPEH™ and BOET would also add LNGCs and service vessels to ship traffic in GOM.	Due to geographic distances and use of different shipping channels, potential for cumulative impacts are minor.

quality from the Proposed Action and the Northern and Southern Site Route Alternatives would be similar in nature, but less than the Proposed Action because it is shorter in length. The Offshore Interconnection with the Gulfstream Pipeline Alternative would have a lesser contribution to cumulative impacts due to the shorter offshore pipeline distance, approximately 24 miles less than the Proposed Alternative, and the smaller construction footprint for the 3,000-foot-wide corridor, approximately 10,000 acres less than the Proposed Alternative (see **Table 2.1-5**).

Water quality impacts from dredged material disposal events result from the small amount of sediment that remains in the water column after a disposal event. In general, the material is rapidly diluted and dispersed and is not discernable after a period of 2 to 3 hours following the disposal event. The small amount of dredged material that remains in the water column can result in temporary impacts from reduced light penetration through the water column which would reduce photosynthesis. The dredged material might also result in the possible release of nutrients or contaminants from the sediments during the descent phase. Reduction of light penetration is usually short in duration (on the order of hours). Nutrient and other contaminant releases from the descending dredged materials generally exhibit no toxicity to sensitive marine organisms. The incremental addition of nutrients or contaminants from dredged materials relative to other sources such as rivers, wastewater treatment facilities, and nonpoint sources, is small and inseparable from ambient conditions. The intermittent nature of the disposal operations, the short time period that material stays in the water column, and rapid dilution and settling further limit any potential effects (USACE 2005).

The Port Dolphin SRVs would withdraw approximately 9.5 MGD of seawater for engine and condensate cooling water and discharge up to 9.5 MGD of cooling water and firewater. The cooling water discharged would have an elevated temperature relative to the ambient temperature of the seawater. Water quality impacts from cooling water withdrawals and discharges would comply with applicable Federal and state water quality standards. The cumulative impacts of current and future activities would affect coastal and marine waters. LNG terminals would have small incremental increase of impacts on water quality.

During operation activities, anchor chains and flexible riser would scour the seafloor resulting in localized, temporary increases in turbidity in the vicinity of disturbed areas. These disturbances would occur periodically during the entire 25-year lifespan of the project and would be cumulative to other anchoring impacts form recreational and commercial vessel anchoring in the area. Also, SRV operations would intake ambient seawater for ballast and cooling activities of the SRVs. Port Dolphin would be separated far enough away from both the MPEH™ and BOET terminals so as to not cause cumulative heating effects on the water temperature from normal vessel water intake and discharge operations. SRVs and support vessels would combine with other ongoing activities in Tampa Bay to produce a minor incremental contribution to cumulative impacts on marine and coastal water quality. The SRVs would not produce new types of impacts on marine or coastal water quality than other vessels in the Federal waters outside of Tampa Bay; however, SRVs would add to existing adverse impacts on water quality in the Tampa Bay vicinity. Support vessels would produce only long-term, direct, adverse incremental contribution to cumulative impacts on marine water quality from normal discharges.

Based upon the information above, the proposed project would have a minor, short-term incremental contribution to cumulative impacts on water quality in the Tampa Bay area. If the water quality mitigations presented in **Section 4.11** (e.g., the use of a pipeline plow and turbidity curtains) are implemented and prove effective, cumulative impacts can be further reduced.

6.3.2 Biological Resources

Cumulative impacts on biological resources from past and ongoing actions in Tampa Bay and the offshore Project area would be expected from vessel operations, onshore and offshore cooling water and industrial discharges, dredging and channelization, and offshore vessel discharges which continue to impact biological resources and wildlife habitat. Foreseeable future actions that could contribute to cumulative biological impacts include oil and gas production, vessels, onshore cooling water intake and discharges, dredging, the MPEH™ and BOET projects in northeastern GOM, and the potential for additional LNG Terminals, future offshore and onshore pipelines, and population growth and coastal development in the Tampa Bay area.

Marine Protected Areas. Construction and operation of Port Dolphin, BOET, MPEH™, and other activities such as the pipeline projects listed in **Section 6.2.2** in the northeastern GOM and Tampa Bay could result in a short-term and long-term, minor to moderate adverse, incremental contribution to cumulative impacts on MPAs within the Project area. MPAs in the coastal and offshore vicinity of the Tampa Bay and in Tampa Bay include four state-designated and managed APs, three offshore NWRs, two FFMZs, and critical habitat for the Florida manatee and piping plover. Cumulative impacts on the living resources that utilize these areas are discussed in detail in subsequent sections.

In general, cumulative impacts on the physical resources in MPAs are limited by the small amount of project activity that occurs within MPA boundaries. For example, since none of the proposed deepwater ports are within MPAs, cumulative impacts as a result of operation of the deepwater ports would be limited to increased vessel traffic and noise impacts. Cumulative increases in operational vessel traffic and noise would be moderate compared to ambient conditions in these areas. Cumulative impacts in the Terra Ceia AP would be associated with pipeline installation (i.e., increased seafloor disturbance, turbidity, vessel traffic, and noise). Construction-related impacts would be temporary in duration and localized in scope to the edges of the AP.

Activities that occur regularly within the ROI, but that are not part of the Proposed Action, have considerable potential to adversely impact Florida manatee critical habitat. These activities include dredging, dredged material disposal, phosphate water disposal, channelization, and land uses t cause persistent sediment disturbance and turbidity. Additionally, nonpoint pollution sources such as agricultural, industrial, and storm water runoff would have long-term, adverse impacts on critical habitat components such as water quality, and can degrade seagrass beds inhabited by manatees. The small-scale temporary nature of impacts associated with the Proposed Action would not be expected to measurably increase cumulative impacts on critical habitat for the manatee in Florida. The contribution to the cumulative impacts on MPAs of the Northern and Southern Site Route Alternatives would be similar to that of the Proposed Action. The Offshore Interconnection with the Gulfstream Pipeline Alternative would have a lesser contribution to cumulative impacts due to fewer disturbances of the ocean bottom for the shorter offshore pipeline distance, a difference of 38.8 km (24 mi) to 60.8 km (38 mi).

Based upon the information above, the proposed project would have a short-term and long-term, minor to moderate adverse, incremental contribution to cumulative impacts on MPAs in the Tampa Bay area. If the water quality mitigations presented in **Section 4.11** (e.g., the use of a pipeline plow and turbidity curtains) are implemented and prove effective, cumulative impacts can be further reduced.

Threatened and Endangered Marine Mammals. This cumulative analysis considers the effects related to the Proposed Action along with impacts of other commercial, military, recreational, offshore, and coastal activities that might occur and adversely affect populations of marine mammals in the same general area of the Proposed Action.

ESA-listed marine mammals occurring in the Proposed Action Area (manatee and rare occurrences of the right whale and humpback whale) face threats from a multitude of man-made and natural sources including recreational and commercial fisheries, oil and gas exploration/development activities, military operations, vessel traffic, ecotourism, habitat degradation, ensonification, pollution, toxic algal blooms, disease, predators, and climate change. Threats to threatened and endangered marine mammals are outlined in recovery plans and status reviews drafted by NMFS and USWFS.

Harassment, injury to, or death of any ESA-listed marine mammal species would be considered a "take" under the ESA. Biological significance of any mortality would depend, in part, on the size and reproductive rates of affected stocks, as well as the number, age, and size of animals affected. For ESA-listed species, "takes" are of particular concern, because of depleted status of those species. For example, the USFWS has consistently concluded in Section 7 Biological Opinion, pursuant to the ESA, that the "take" of a single manatee would "jeopardize the continued existence" of the species (USFWS 2000). As noted earlier, the only other ESA-listed marine mammals that might occur rarely in Florida coastal waters of the GOM are the North Atlantic right whale and humpback whale. NOAA Stock Assessment Reports list potential biological removal rates (PBR; maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population) of 1 individual for the North Atlantic right whale and 1.1 individuals for the humpback whale (Waring et al. 2008). With the proposed mitigation measures, no serious injury or mortality of ESA-listed marine mammals is expected for the Port Dolphin project.

The incremental contribution of impacts from Port Dolphin, in conjunction with other similar activities in the GOM, would result from an increase in noise, increased risk of collisions with vessels, increase in marine debris, and impacts on water quality. OCS activities in the GOM that could impact ESA-listed marine mammal species include degrading water quality via routine discharges; increasing vessel strikes due to increased vessel traffic; generating noise from platforms, drill ships, helicopters and vessels, seismic surveys, and removal of structures by vessels; inadvertent spills during construction and decommissioning; sodium hypochlorite spills during operation; spill emergency response activities; discharging debris from offshore service and support vessels and OCS structures. Activities that might occur or are proposed in the GOM that could contribute to cumulative impacts include installation and operation of LNG regasificiation facilities.

The increase in ambient noise is a concern for ESA-listed marine mammal species. Increased vessel traffic and operations associated with Port Dolphin would overlap with noise generated by other vessels, thus contributing to this concern. Noise produced by service vessels and the construction, operation, and removal of drill rigs might cause physiological stress and make animals more susceptible to disease or predation, as well as disrupt their normal activities.

There were 120,915 recreational vessels and 2,677 commercial vessels registered in Manatee, Hillsborough, and Pinellas counties in 2007 (FHSMV 2006). Total service vessel trips for OCS activities are expected to be between 6 to 9 million trips in the GOM for the years 2007 to 2046 (MMS 2007). This would equate to an average of 150,000 to 225,000 service vessel trips per year. No comparable numbers specifically for the northeastern GOM are available. In comparison, 938 service vessel trips per year are expected during operation of the Port Dolphin project. Construction and decommissioning would require approximately 1,600 and 154 total trips, respectively.

The increase in vessel activity in inshore and offshore GOM waters due to LNG operations could increase the occurrence of collisions between marine mammals and vessels, potentially resulting in increased injury or death. Manatees are most often found in shallow coastal waters, including bays with seagrass beds. Rare occurrences further from shore are documented for the GOM. Major threats to the manatee, right whale, and humpback whale include vessel strikes related to recreational and commercial boating

activities that occur in both nearshore and offshore waters. Indirect effects from increased vessel traffic include increased wave action due to vessel wakes and scarring of seagrass beds by propellers (EPC 2007). Seagrasses are important foraging areas for the manatee. Wakes affect seagrass beds by the increase of wave action which could play a role in the decline of longshore sandbars that help protect seagrasses (Lewis 2002), as well as increased turbidity that, as noted earlier, reduces light availability and, therefore, seagrass production.

Cumulative impacts associated with additional LNG facilities and other activities could result in an increase in marine debris. Ingestion of or entanglement in marine debris, particularly plastic items lost from SRVs and service vessels, could result in marine mammal injury or death. However, the prohibition of discharge or disposal of garbage and other solid debris from vessels by lessees and operators by the MMS (30 CFR 250.300) and the USCG (MARPOL, Annex V, P.L. 100-220 [101 Statute 1458]) (33 CFR Part 151) is expected to minimize cumulative impacts of marine debris.

Cumulative impacts associated with additional LNG facilities and other activities would result in an increased risk of an oil spill. Although unlikely, oil spills and oil-spill response activities are potential threats that might cause marine mammal deaths. Contact with or consumption of oil and oil-contaminated prey (including seagrasses) might seriously affect marine mammals. The Port Operations Manuals from all approved deepwater ports include detailed engineering and procedural conditions necessary to minimize the potential occurrence of spills and minimize potential impacts from spills that might occur.

Overall, construction and operation of the offshore components of Port Dolphin combined with two other operating or proposed LNG deepwater ports in northeastern GOM and other OCS activities could result in minor, adverse cumulative impacts on marine mammals for the Proposed Alternative and the other alternatives analyzed. It is anticipated that the contribution to cumulative impacts of the other alternatives analyzed would be similar to those of the Proposed Alternative discussed above. The mitigation measures discussed in **Section 4.11** for marine mammal vessel strike, noise disturbance, and entanglement, and similar mitigation measures proposed at the other LNG facilities, are expected to minimize cumulative impacts on marine mammals. The incremental contribution of Port Dolphin to these cumulative impacts would be minor compared to the existing levels of commercial, recreational, fishing, military, and oil and gas exploration/development activities in the GOM.

Threatened and Endangered Sea Turtles. Construction and operation of the offshore components of Port Dolphin combined with two other operating or proposed LNG deepwater ports in northeastern GOM and other OCS activities could result in a minor, adverse incremental contribution to cumulative impacts on sea turtles. Cumulative impacts on federally listed sea turtles would primarily result from increased vessel traffic, noise, marine debris, and accidental spills and would be the same for all Port Dolphin alternatives analyzed. These impacts could create chronic sublethal effects (e.g., stress) that could cause persistent physiological or behavioral changes, such as the avoidance of impacted areas. This could cause declines in survival or productivity and result in either acute or gradual population reduction. Any harassment of, injury to, or mortality of a sea turtle would be considered a “take” under the ESA.

ESA-listed sea turtles occurring in the Proposed Action area face threats from a multitude of man-made and natural sources. Sources include recreational and commercial fisheries, military operations, vessel traffic, ecotourism, habitat degradation, ensonification, pollution, beach lighting, disease, predators, and climate change. Threats to threatened and endangered sea turtles are outlined in recovery plans and status reviews drafted by NMFS and USWFS as described below.

The increase in vessel activity in inshore and offshore GOM waters could increase the occurrence of collisions between sea turtles and vessels, potentially resulting in increased injury or death. Major threats to sea turtles include vessel strikes related to recreational and commercial boating activities that occur in

both nearshore and offshore waters. Indirect effects from increased vessel traffic include increased wave action due to vessel wakes and scarring of seagrass beds by propellers (EPC 2007). Seagrasses are important foraging areas for the green turtle. Wakes affect seagrass beds by the increase of wave action which could play a role in the decline of longshore sandbars that help protect seagrasses (Lewis 2002), as well as increased turbidity that, as noted earlier, reduces light availability and, therefore, seagrass production.

Cumulative impacts associated with additional LNG facilities and other activities could result in an increase in noise. Noise produced by construction vessels, service vessels, SRVs and the construction, operation, and removal of drill rigs might cause physiological stress and make animals more susceptible to disease or predation, as well as disrupt their normal activities. Adverse effects resulting from construction of the three proposed ports in the northeastern GOM are expected to be temporary. Therefore, cumulative effects would be minor. Operation of the Port would result in a moderate increase in vessel traffic and therefore a moderate increase in noise.

Cumulative impacts associated with additional LNG facilities and other activities could result in an increase in marine debris. Ingestion of or entanglement in marine debris, particularly plastic items lost from SRVs and service vessels, could result in sea turtle injury or death. However, the prohibition of discharge or disposal of garbage and other solid debris from vessels by lessees and operators by the MMS (30 CFR 250.300) and the USCG (MARPOL, Annex V, P.L. 100-220 [101 Statute 1458]) (33 CFR Part 151) is expected to minimize cumulative impacts of marine debris. Discharge of plastics is strictly prohibited and is therefore never authorized; this includes ashes from burned plastics. All plastics must be tracked and returned to shore.

Cumulative impacts associated with additional LNG facilities and other activities would result in an increased risk of an oil spill. Although unlikely, oil spills and oil-spill response activities are potential threats that might cause sea turtle deaths. Contact with or consumption of oil and oil-contaminated prey might seriously affect sea turtles, and sea turtles have been seriously harmed by oil spills in the past. The Port Operations Manuals from all approved deepwater ports include detailed engineering and procedural conditions necessary to minimize the potential occurrence of spills and minimize potential impacts from spills that might occur.

Overall, the mitigation measures discussed in **Section 4.11** for sea turtle vessel strike and entanglement, and similar mitigation measures proposed at the other LNG facilities, are expected to minimize cumulative impacts on sea turtles. The incremental contribution of Port Dolphin to these cumulative impacts would be minor adverse compared to the existing levels of commercial, recreational, fishing, oil and gas exploration/development, and military activities in the GOM.

Threatened and Endangered Fish Species. Construction of the deepwater port when combined with other proposed LNG deepwater ports in the northeastern GOM and other OCS activities could result in a minor adverse incremental contribution to cumulative impacts on the smalltooth sawfish and Gulf sturgeon. Short-term, minor to moderate, direct, adverse impacts on smalltooth sawfish and Gulf sturgeon would result from the seafloor disturbance, turbidity, and noise associated with the proposed construction of Port Dolphin and would be the same for all Port Dolphin alternatives analyzed. Reasons for the decline of smalltooth sawfish include catch in commercial and recreational fisheries, habitat loss and degradation, entanglement in marine debris, injury from saw removal, pollution, and disturbance of natural behavior by divers and other marine activities (NMFS 2006). Threats to Gulf sturgeon include exploitation, incidental catch in shrimp and gillnet harvest, and habitat reduction and degradation (e.g., dams, contamination, and navigation activities such as dam construction, and dredging) (USFWS and GSMFC 1995).

The mitigation measures discussed in **Section 4.11** for smalltooth sawfish strike and entanglement, and similar mitigation measures proposed at the other LNG facilities, are expected to minimize cumulative impacts on threatened and endangered fish species. Overall, Port Dolphin would have a minor incremental contribution on cumulative impacts of these two fish species.

Threatened and Endangered Coastal and Marine Birds. Construction and operation of the offshore components of Port Dolphin combined with two other operating or proposed LNG deepwater ports in the northeastern GOM and other OCS activities could result in a minor, adverse incremental contribution to cumulative impacts on coastal and marine birds. Cumulative effects would result from a minor increase in vessel traffic, noise, marine debris, and offshore lighting and would be the same for all Port Dolphin alternatives analyzed. Considering the narrow coastal ranges of the federally listed piping plover, wood stork, and roseate tern; and state-listed snowy plover and least tern, these species are not likely to appear in the vicinity of the proposed LNG facilities. Additionally, mitigation measures proposed in **Section 4.11**, and similar mitigation measures proposed at the other deepwater ports, are expected to minimize cumulative impacts on coastal and marine birds.

Benthic Resources. Construction and operation of offshore components of the Port Dolphin Deepwater Port in combination with up to two other deepwater ports in the northeastern GOM and other OCS activities could result in cumulative effects on benthic resources. Past projects, such as the Gulfstream pipeline, were constructed through approximately 28.7 miles of live-bottom area (FERC 2001). Other projects that could have short-term and long-term cumulative impacts on benthic resources off the west coast of Florida include other pipeline installation projects, dredging, beach nourishment projects, other oil and gas leasing/mineral leasing projects, and other commercial and recreational activities, such as boating and fishing, that could disturb the seafloor. Construction, operation, and decommissioning of the proposed ports could have both a short- and long-term, adverse incremental contribution to cumulative impacts on benthic organisms and habitat. Short- and long-term minor, adverse benthic impacts would result from placement of structures and processes that disturb bottom habitat. Short-term impacts would be associated with construction and demolition of port infrastructure and disturbance of soft substrate. Long-term impacts would be associated with placement of the STL buoy, concrete mattresses, and disturbance of hard-bottom habitat. All proposed deepwater ports would be designed, constructed, and operated in accordance with established, applicable, and appropriate regulations, permit conditions, and industry guidelines to minimize or avoid benthic impacts. Impact areas for each viable port proposal and the cumulative areas are presented in **Table 6.3-2**. When compared to the nearly uniform benthic habitat type available in the northern GOM (approximately 186 million acres—based on half of the area of the GOM), the 5,886 acres of short-term and 81 acres of long-term impacts associated with three deepwater ports in the northeastern GOM are minor. However, cumulative impacts on hard and live-bottom habitat would be more severe because this type of habitat is less common and recovery of this type of habitat would take longer. Port Dolphin is the only deepwater port in the northeastern GOM that is expected to impact hard and live bottom. It is also the only deepwater port proposed for the west coast of Florida where hard- and live-bottom habitat, like limestone outcroppings, is more likely. The contribution to cumulative impacts on benthic resources is expected to be less for the Offshore Interconnection with the Gulfstream Pipeline Alternative due to the shorter pipeline construction and the smaller construction footprint (see **Table 2.1-5**).

Construction of the pipeline in Tampa Bay in combination with other pipeline projects in the Tampa Bay (see **Table 6.2-4**), dredging, and other commercial and recreational activities such as boating and fishing could have short-term and long-term, adverse cumulative impact on benthic resources in Tampa Bay. Construction and operation of the proposed pipeline could have both a short- and long-term, adverse incremental contribution to cumulative impacts on benthic organisms and habitat. Short- and long-term minor benthic impacts would result from placement of structures and processes that disturb bottom

Table 6.3-2. Benthic Impact Areas for Proposed and Existing Deepwater Ports in the Northeastern GOM

LNG Facility	Temporary Impacts - Pipeline Installation and Other (Acres)	Long-Term Impacts - Infrastructure (Acres)
Port Dolphin	9272	Less than 1
MPEH™[a]	4,515	6
BOET[b]	1,137	9
Total Northeastern GOM	**5,886**	**81**

Sources: a. USCG and MARAD 2006, b. USCG and MARAD 2007d

habitat. Short-term impacts would be associated with the disturbance of soft sediments. Long-term impacts would be associated with placement of concrete mattresses and disturbance of hard and live-bottom habitat. Long-term cumulative impacts on benthic resources in Tampa Bay are expected to be moderate, based on the number of pipeline projects proposed in Tampa Bay and the characteristics of the benthic habitat in Tampa Bay. Additionally, mitigation measures proposed in **Section 4.11** (e.g., additional geophysical surveys to identify avoidance zones), and similar mitigation measures proposed at the other deepwater ports, are expected to minimize cumulative impacts on benthic resources.

Nonthreatened and Nonendangered Marine Mammals. This cumulative analysis considers the effects related to the Proposed Action and the alternatives along with impacts of other commercial, military, recreational, offshore, and coastal activities that might occur and adversely affect populations of marine mammals in the same general area of the Proposed Action. Dolphins occurring in the Proposed Action Area (e.g., bottlenose, Atlantic spotted, and rough-toothed dolphins) face threats from a multitude of man-made and natural sources including recreational and commercial fisheries, oil and gas exploration/development activities, military operations, vessel traffic, ecotourism, habitat degradation, ensonification, pollution, toxic algal blooms, disease, predators, and climate change.

Harassment, injury to, or death of any marine mammal species would be considered a “take” under the MMPA. Biological significance of any mortality would depend, in part, on the size and reproductive rates of affected stocks, as well as the number, age, and size of animals affected. NOAA Stock Assessment Reports list potential biological removal rates (PBR; maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population) (Waring et al. 2008). With the proposed mitigation measures, no serious injury or mortality of marine mammals is expected for the Port Dolphin project.

The incremental contribution of impacts from Port Dolphin, in conjunction with other similar activities in the GOM, would result from an increase in noise, increased risk of collisions with vessels, increase in marine debris, and impacts on water quality. OCS activities in the GOM that could impact marine mammal species include degrading water quality via routine discharges; increasing vessel strikes due to increased vessel traffic; generating noise from platforms, drill ships, helicopters and vessels, seismic surveys, and removal of structures by vessels; inadvertent spills during construction and decommissioning; sodium hypochlorite spills during operation; spill emergency response activities; and discharging debris from offshore service and support vessels and OCS structures. Activities that might occur or are proposed in the GOM that could contribute to cumulative impacts include installation and operation of LNG regasificiation facilities.

The increase in ambient noise is a concern for marine mammal species. Increased vessel traffic and operations associated with Port Dolphin would overlap with noise generated by other vessels, thus contributing to this concern. Noise produced by service vessels and the construction, operation, and removal of drill rigs might cause physiological stress and make animals more susceptible to disease or predation, as well as disrupt their normal activities.

The increase in vessel activity in inshore and offshore GOM waters could increase the occurrence of collisions between marine mammals and vessels, potentially resulting in increased injury or death. Indirect effects from increased vessel traffic include increased wave action due to vessel wakes and scarring of seagrass beds by propellers (EPC 2007). Seagrasses are important fish nursery habitat areas. Wakes affect seagrass beds by the increase of wave action which can play a role in the decline of longshore sandbars that help protect seagrasses (Lewis 2002), as well as increased turbidity that, as noted earlier, reduces light availability and, therefore, seagrass production.

Cumulative impacts associated with additional LNG facilities and other activities could result in an increase in marine debris. Ingestion of or entanglement in marine debris, particularly plastic items lost from SRVs and service vessels, could result in marine mammal injury or death. However, the prohibition of discharge or disposal of garbage and other solid debris from vessels by lessees and operators by the MMS (30 CFR 250.300) and the USCG (MARPOL, Annex V, P.L. 100-220 [101 Statute 1458]) (33 CFR Part 151) is expected to minimize cumulative impacts of marine debris.

Cumulative impacts associated with additional LNG facilities and other activities would result in an increased risk of an oil spill. Although unlikely, oil spills and oil-spill response activities are potential threats that might cause marine mammal deaths. Contact with or consumption of oil and oil-contaminated prey (including seagrasses) might seriously affect marine mammals. The Port Operations Manuals from all approved deepwater ports include detailed engineering and procedural conditions necessary to minimize the potential occurrence of spills and minimize potential impacts from spills that might occur.

Overall, construction and operation of the offshore components of Port Dolphin combined with two other operating or proposed LNG deepwater ports in northeastern GOM and other OCS activities could result in a minor, adverse incremental contribution to cumulative impacts on nonthreatened and nonendangered marine mammals for the Proposed Alternative and the other alternatives analyzed. The mitigation measures discussed in **Section 4.11** for marine mammal vessel strike, acoustic disturbance, and entanglement, and similar mitigation measures proposed at the other LNG facilities, are expected to minimize cumulative impacts on marine mammals. Overall, the incremental contribution of Port Dolphin to these cumulative impacts would be minor compared to the existing levels of commercial, recreational, fishing, military, and oil and gas exploration and development activities in the GOM.

Nonthreatened and Nonendangered Coastal and Marine Birds. Construction and operation of Port Dolphin, BOET, MPEH™, and other activities in the northeastern GOM could result in cumulative impacts on coastal and marine birds. There is a potential for short-term, minor, adverse cumulative impacts on occur on coastal and marine birds as a result of temporary noise disturbances and lighting associated with pipeline construction activities. Increases in noise disturbances and lighting could disrupt foraging, breeding, and migration, or even cause persistent behavioral changes, such as the avoidance of these important areas. The incremental contribution of the Proposed Action to noise and lighting in the area would be negligible compared to the level of disturbance that already occurs there. Any displaced birds should return to the area after the pipeline is installed. Overall the impact of Port Dolphin on coastal and marine birds would be short-term and minor when compared to the commercial, recreational, and industrial activity in the northeastern GOM, Tampa Bay, and the west coast of Florida. The incremental contribution to cumulative impacts of the other alternatives analyzed would be similar to that of the Proposed Alternative. Additionally, mitigation measures proposed in **Section 4.11**, and similar mitigation

measures proposed at the other deepwater ports, are expected to minimize cumulative impacts on coastal and marine birds.

Plankton. Construction and operation of the Port Dolphin, MPEH™, and BOET deepwater ports and other activities in the northeastern GOM, such as seawater to cool diesel engines aboard ships and general water degradation, could result in cumulative effects on plankton including phytoplankton, zooplankton (holoplankton), and meroplankton (fish and invertebrate eggs and larvae).

Vessels powered by engines require intake of seawater to cool the engines. Most engine designs circulate seawater through engine coolers in a once-through process. Advanced cooling systems use intermediate loops to restrict direct contact of seawater and do not circulate cooling water directly. The overall impact from this seawater intake on impingement or entrainment of plankton is not known.

The cumulative impact on zooplankton can be estimated based on zooplankton densities in the area and a combined seawater intake of 151 MGD (see **Table 6.3-3**). The daily impact on zooplankton was estimated based on the wet weight of the standing crop of zooplankton on the western Florida shelf ranging from 0.031 to 0.2 mg/m^3 (2.6 x 10-7 to 1.7 x 10-6 pounds/gallon) and a total seawater intake of 151 MGD (Okey and Mahmoudi 2002). Seawater use by the deepwater ports would, therefore, remove approximately 14,235 to 93,440 pounds of zooplankton each year. Limitations of this analysis are based on the fact that the distribution and abundance of zooplankton is spatially variable and patchy and the gear used to collect zooplankton might have been too large to collect smaller zooplankton which could be important to total biomass.

Table 6.3-3. Average Egg and Larval Density Comparison for the Proposed GOM Deepwater Ports

Deepwater Port	Daily Seawater Intake (Million Gallons/Day)	Average Annual Seawater Intake (Billion Gallons/Year)	Distance Offshore (mi)	Depth of Water (feet)	Average Egg Density per Million Gallons of Seawater	Average Larval Density per Million Gallons of Seawater
Port Dolphin	24	8.8	28	100	3,400	12,000
MPEH™ [a]	0	0	16	210	8,200	11,000
BOET [b]	127	49.6	50	425	3,500	9,100
Total Estimated Annual Warming Water Intake in the Northeastern GOM from 3 LNG Terminals: 58.4 billion gallons per year						

Sources: a. USCG and MARAD 2006, b. USCG and MARAD 2007d

Laboratory and field studies of marine organisms indicate that the average efficiency of energy transfer from one trophic level on the food web to the next trophic level is about 10 percent. In other words, only 10 percent of the energy available at one trophic level is passed on to the next (Sumich 1988). Therefore, a loss of 14,235 to 93,440 pounds of zooplankton each year would result in the total annual loss of approximately 1,423 to 9,344 pounds of small planktivorous fish biomass and approximately 142 to 934 pounds of large piscivorous fish biomass. This represents a minor loss compared to the total amount of biomass available in the GOM.

A long-term, minor adverse, incremental contribution to cumulative impacts on zooplankton would result from the cooling water withdrawals and warming water discharges associated with the deepwater ports. An increase in temperature could result in adverse impacts on zooplankton in the discharge plume.

Additionally, the plankton community is dynamic and greatly affected by the circulatory patterns in the GOM. Based on these dynamics, impacts on plankton would be minor.

The impacts of the seawater intake on ichthyoplankton are described and quantified for the Port in **Section 4.11** and in **Appendix G.** The number of eggs and larvae potentially entrained in a year is adjusted forward in time to resemble a fishery yield or harvest and is referred to as annual equivalent yield. The annual equivalent yield was used as a base for a reasonable comparison. The annual equivalent yield (for red drum and red snapper) associated with two proposed deepwater ports and the percentage of the average annual Florida west coast landings (1990 to 2006) that this equivalent yield represents are presented in **Table 6.3-4**. Gulf menhaden was not quantitatively assessed for the proposed Project. It is likely that Gulf menhaden would be entrained by seawater intake associated with the proposed Port. Egg and larval entrainment is likely to be less than entrainment of Spanish sardines. Data collected by Houde et al. (1979) indicate that *Brevoortia* spp. (the genus that includes Gulf menhaden) occurred at depths of less than 30 m (98 feet) and that *Brevoortia* spp. were less common than any of the other clupeids (e.g., Spanish sardines), suggesting that concentrations of menhaden are relatively low in the eastern GOM.

Table 6.3-4. Average Annual Equivalent Yield Estimate Comparison for Northeastern GOM Deepwater Ports

Deepwater Port	Gulf Menhaden	Red Drum	Red Snapper
Port Dolphin	NA	14	45
MPEH™ [a]	0	0	0
BOET [b]	94,581	654	174
Total Northeastern GOM	**94,581**	668	219

Sources: a. USCG and MARAD 2006, b. USCG and MARAD 2007d

Notes: NA = Not Assessed. Gulf menhaden were not quantitatively assessed for Port Dolphin.

As stated in **Section 4.2.1.11.1**, bay anchovy, red drum, and red snapper are 3 of 217 species that have been sampled at the Project area in the SEAMAP data. Note, that with respect to the USCG/Maritime Administration standard methodology used to assess impacts of a LNG deepwater port on ichthyoplankton, these species are not necessarily representative of all ichthyoplankton that occurs in the Project area, but representative of commercially and ecologically important species that occur at the Project area. These species have life history information available that can be used to estimate impacts of the seawater intake associated with deepwater ports (see **Section 4.2.1.11.1**). Estimated impacts on these species are expected to be representative of impacts on other ecologically and commercially important species that occur in the Project area. Equivalent yield was only estimated consistently for red drum and red snapper for all three deepwater ports in the northeastern GOM. As it is not a commercial species, equivalent yield was not estimated for bay anchovies; therefore, it is not included in this portion of the cumulative impact analysis.

MPEH™ does not contribute to cumulative impacts on ichthyoplankton of the deepwater ports on the northeastern GOM. For the Proposed Action and the other alternatives, Port Dolphin would contribute approximately 2 percent of the cumulative impact of the two deepwater ports on red drum and 20 percent of the cumulative impact two deepwater ports on red snapper. Therefore, BOET would contribute approximately 98 percent of the cumulative impact of the two deepwater ports on red drum and 80 percent of the cumulative impact of the two deepwater ports on red snapper. However, the data limitations discussed in **Section 4.2.1.11.1** and **Appendix G** also apply to this cumulative impact

assessment. Cumulative impacts on other species would occur as well. These impacts are expected to be within the range of the cumulative impacts for the species described.

The incremental contribution of seawater intake associated with the proposed project could have long-term impacts on fisheries stocks. However, as stated above the incremental contribution of the Port Dolphin Proposed Alternative and the other alternatives analyzed is less than the contribution of BOET (as described above).

Fisheries Resources. Construction and operation of the Port Dolphin and BOET deepwater ports and other activities in the northeastern GOM could result in cumulative impacts on red drum and red snapper fisheries, as well as other fisheries resources and EFH. Note that MPEH™ does not contribute to cumulative impacts on ichthyoplankton of the deepwater ports on the northeastern GOM. **Tables 6.3-5** through **6.3-7** provide an estimate of the possible loss of red snapper and red drum due to the Port Dolphin and BOET deepwater ports. These tables compare estimated annual equivalent yield to fishery harvest of red drum and red snapper to average total landing (commercial and recreational) from 1990 through 2006 for the GOM, northeastern GOM, and the west coast of Florida, respectively. In all cases, annual equivalent yield estimates of the two proposed deepwater ports account for less than 1 percent of the average 1990 through 2006. Additionally, the contribution of Port Dolphin would be a much smaller impact, as the impact of Port Dolphin is only expected to be a fraction of the impact of BOET, based on the seawater intake. The contribution to cumulative impacts of construction and operation of Port Dolphin would be similar for all alternatives analyzed.

Table 6.3-5. Annual Cumulative Equivalent Yield Estimates Based Compared as Percentages of 1990 to 2006 GOM Landings

Species	Equivalent Yield (lb)	GOM Landings (lb)	Equivalent Yield as a Percent of Landings
Red Drum	668	10,530,135	0.01
Red Snapper	219	7,411,312	0.00

Sources: a. USCG and MARAD 2006, b. USCG and MARAD 2007d

Table 6.3-6. Annual Cumulative Equivalent Yield Estimates Based Compared as Percentages of 1990 to 2006 Northeastern GOM Landings

Species	Equivalent Yield (lb)	Northeastern GOM Landings (lb)	Equivalent Yield as a Percent of Landings
Red Drum	668	2,281,436	0.03
Red Snapper	219	1,296,070	0.02

Sources: a. USCG and MARAD 2006, b. USCG and MARAD 2007d

Table 6.3-7. Annual Cumulative Equivalent Yield Estimates Based Compared as Percentages of 1990 to 2006 Florida West Coast Landings

Species	Equivalent Yield (lb)	Florida West Coast Landings (lb)	Equivalent Yield as a Percent of Landings
Red Drum	668	1,296,070	0.05
Red Snapper	219	1,802,225	0.01

Sources: a. USCG and MARAD 2006, b. USCG and MARAD 2007d

Based on the Monitoring, Prevention, and Mitigation Plan that would be required by the Maritime Administration for each deepwater port license issued, mitigations would be required to address identifiable impacts above baseline conditions. This would further reduce cumulative impacts associated with deepwater ports. Specifically, the Maritime Administration has made a commitment to review monitoring data within 3 years of the start of operations and require the Applicant to develop mitigation measures if the monitoring indicates that impacts are greater than baseline conditions.

It is difficult to measure the extent of historical and current impacts related to fishing, but the MSA calls for direct actions to stop or reverse the continued loss of fish habitats. Toward this end, the GMFMC manages fishery resources off the west coast of Florida and other GOM states through FMPs (discussed in **Section 3.2.9**). As described in **Section 6.2.7** red snapper, greater amberjack, gag grouper, and gray triggerfish are overfished. In order for these stocks to recover, mortality needs to be reduced (NMFS 2008). BOET and Port Dolphin would contribute to the total mortality of these species; however, the contribution of the deepwater ports on the mortality of these species would be minor compared to the impact of fishing, and could not have an affect the rebuilding plans (described in **Section 6.2.7**) for these species.

Minor short- and long-term indirect adverse impacts on demersal (i.e., bottom-dwelling) fish and benthic shellfish would occur as a result of seafloor disturbance caused during construction of the three deepwater port projects in the northeastern GOM. Impacts from Port Dolphin are discussed in **Section 4.2.1.13**. Other projects that could have short-term and long-term cumulative impact on demersal fish and benthic shellfish off the west coast of Florida and in Tampa Bay include other pipeline projects, dredging, beach nourishment projects, other oil and gas leasing/mineral leasing projects, and other commercial and recreational activities such as boating and fishing.

Other activities that could result in cumulative impacts on fisheries resources and EFH include overfishing, habitat degradation caused by commercial and recreational fishing, and a general degradation of water quality. Specific activities in Tampa Bay that have an adverse impact on fisheries resources include Project installation, cooling water intakes and discharges, other effluent discharge, loss of trash and debris from vessels, vessel traffic, shipping, commercial and recreational fishing, and seawater intake for cooling and warming purposes. Overall the impact of Port Dolphin on fisheries and EFH would be minor when compared to the commercial, recreational, and industrial activity in the northeastern GOM, Tampa Bay, and the west coast of Florida.

Terrestrial Resources. Cumulative impacts on the Project area are expected to be minimal and short-term. Past impacts on the area include the development of Port Manatee, which is still in operation today (MCPA 2008) and the Piney Point Phosphate Plant. The Piney Point mine was historically a producer of phosphate fertilizer for agriculture. Production has ceased at the plant. The wet process phosphoric acid production plant was first licensed by the Florida Bureau of Radiation Control for the processing and disposal of technically enhanced concentrations of naturally occurring radioactive materials (TENORM) in 1989. TENORM occurs as radium scale (radium 226) in pipes and process equipment, and in the associated process-area soils. The Florida Bureau of Mine Reclamation administers a permit for the operation and closure of the phosphogypsum stack and the onsite repository for the mine spoils. The phosphogypsum stack also serves as the repository for TENORM-contaminated equipment and soils. Piney Point Phosphates, Inc., went into bankruptcy and receivership in 2001. The Florida Bureau of Mine Reclamation has managed the site and the closure of the gypsum stack since that time. HRK Holdings, LLC, who is now participating in the final closure, purchased the site (NRC 2008). Additionally, current commercial land use classifications along the pipeline route include Urban and Built-Built Up (Residential High Density: High Density Under Construction; Commercial and Services: Mixed Commercial and Services; Industrial: Mineral Processing; Agriculture: Tree Crops-Abandoned Groves) and Transportation, Communications, and Utilities (Transportation: Railroads, Roads and

Highways; Port Facilities; Oil, Water or Gas Transmission Lines; and Utilities: Electric Power Transmission Lines). These land use classifications account for approximately 84 percent or 25 of 30 acres that is crossed by the Port Dolphin onshore pipeline route.

Wetland losses in the United States have resulted from draining, dredging, filling, leveling, and flooding for urban, agricultural, and residential development. Between the 1780s and the 1980s, Florida lost more than 46 percent of its wetlands. However, the rate of wetland loss in Florida was curtailed, with a 0.2 percent wetland loss from the 1980s to the 1990s (Caffey and Schexnayder 2003). In 2001, the Gulfstream Pipeline Project EIS estimated that the construction would occur within 3.5 miles of forested wetlands (FERC 2001). Construction and operation of the proposed pipeline are expected to result in up to 5.13 acres of temporary wetland impacts and 7.94 acres of permanent wetland impacts in Florida. The onshore portion of the proposed Port Dolphin pipeline corridor would cross 11 individual sections of wetlands, including open water, scrub-shrub, emergent, and forested wetlands totaling approximately 13.07 acres. Following construction, the disturbed wetland sections would be restored, revegetated, and monitored in accordance with a site-specific restoration plan. Port Dolphin's permanent operation of the pipeline would prevent trees and some larger shrubs from reestablishing directly over or adjacent to the pipeline. This would not result in a net loss of wetlands, but rather a conversion to emergent or smaller shrub type.

The primary cumulative impact of constructing the Port Dolphin onshore segment would be from simultaneous ground-disturbing activities and removal of vegetative cover. Cumulative impacts would be similar for the Proposed Alternative and the other alternatives analyzed. While the area is currently disturbed, some forested wetlands would be converted to emergent or smaller shrub type. This would result in an incremental contribution to an overall loss of forested wetlands in Florida that are caused by draining, dredging, filling, leveling, and flooding for urban, agricultural, and residential development. Associated with the cumulative losses of forested wetlands in Florida are associated impacts on wildlife and threatened and endangered species, the only affected species would be the American kestrel. One of the primary threats to American kestrel is habitat destruction (Scott 2004). Therefore, the Proposed Action would result in an incremental contribution to cumulative impacts on American kestrel. However, because only a small area of forested wetlands would be converted, the incremental contribution of the Proposed Action would be negligible.

There is a potential for a short-term minor adverse incremental contribution to cumulative impacts on wildlife and threatened and endangered species as a result of temporary noise disturbances associated with pipeline construction activities. As indicated above, land use in the area of the onshore pipeline route is primarily industrial. Any displaced wildlife should recolonize the area after the Project area is revegetated. Additionally, mitigation measures proposed in **Section 4.11** (e.g., terrestrial pipeline and facilities BMPs), and similar mitigation measures proposed at the other deepwater ports, are expected to minimize cumulative impacts on coastal and marine birds.

6.3.3 Cultural Resources

Cumulative impacts on cultural resources from past actions in Tampa Bay and the Project area would be expected from land disturbance actions that might have resulted in possible destruction of unknown artifacts. Very minor current or future adverse cumulative impacts on cultural resources are foreseen because of the identification and recordation of historic and cultural resources undertaken by Federal agencies in compliance with NHPA. Because of the chance of unintentional damage to cultural resources inherent with any ground disturbance project, the impacts of foreseeable future actions cannot be dismissed. Cumulative impacts from the Port Dolphin project on archeologically sensitive areas should be eliminated by mitigation through avoidance during construction. The cumulative impacts would be the same for all alternatives analyzed.

Offshore Components. Disturbance of the seafloor in the offshore APE in Florida has the potential to cause major, long-term, adverse, impacts on historic shipwrecks that represent archeological sites. Identification and evaluation of archeological sites within the APE would be required prior to any construction. The proposed Project system would be constructed to avoid impacts on submerged archeological sites that are listed in or eligible for listing in the NRHP. An Unanticipated Discoveries Plan is presented in **Appendix I**, designed to protect offshore cultural resources during construction. Implementation of the plan is necessary to avoid adverse direct, indirect, or cumulative impacts on historic properties.

Offshore cultural resource surveys conducted prior to application for the deepwater Port employed remote sensing equipment to conduct detailed magnetic and sonar surveys of all areas potentially affected during construction. These cultural resource surveys are expected to be highly effective at identifying possible historic shipwrecks and prehistoric/historic archeological sites within the area surveyed. Potential high probability areas for containing prehistoric archeological resources and remote sensing targets representing possible historic shipwreck remains were identified for avoidance, and avoidance during construction should eliminate adverse impacts on these archeologically sensitive areas. If avoidance efforts are successful, there would be no adverse direct, indirect, or cumulative impacts on historic properties listed or eligible for listing on the NRHP from any of the route alternatives. Operation and decommissioning of the proposed Port Dolphin LNG system have little potential for cumulative impacts on cultural resources.

Onshore Components. Onshore surveys employed archival research, pedestrian reconnaissance, and systematic shovel testing to locate archeological sites and historic structures within or adjacent to the proposed pipeline construction corridor. These cultural resources surveys were effective at identifying possible prehistoric/historic archeological sites, and historic structures within the area surveyed. An archeological survey of any unsurveyed areas is required prior to construction. Survey, however, does not ensure 100 percent coverage, so an Unanticipated Discovery Plan helps protect unidentified onshore cultural resources during construction (see **Appendix I**). Implementation of the plan would be necessary to avoid adverse direct, indirect, or cumulative impacts on historic properties. Finally, the Applicant would support the USCG in all required consultations with the FDHR and interested federally recognized Native American tribes by providing the results of the archeological survey conducted in support of this application and any anticipated impacts on resources of traditional, religious, or cultural significance to consulted tribes.

The footprint for the proposed interconnection station and the valve station have been surveyed with negative results for archeological sites, and lie at a sufficient distance (greater than one-half mile) from the closest historic structure (8MA1324) to avoid impacts on the viewshed or setting of that structure.

6.3.4 Geological Resources

Cumulative impacts on geological resources from past, current, and foreseeable future actions in Tampa Bay and the Project area would be expected from oil and gas production, installation of pipelines and structures on the OCS, dredging of shipping channels, and beach nourishment projects. The GOM and Tampa Bay have been and are currently disturbed by fishing and dredging activities. Initial sonar surveys have been conducted for the Proposed Site and Route Alternative and the Southern Site and Route Alternative disturbance areas. Results indicate there are 18.03 acres (7.29 hectares) of hard bottom that would require the use of concrete mattresses along the seafloor. In these areas the pipeline would be placed on top of the hard bottom. No blasting or excavation would be conducted to place and cover the transmission line so impacts on the hard bottom would be expected to be minimal. In addition, potential impacts on hard bottom resulting from chain sweep associated with anchoring of installation barges would be minimized as a result of the development of an anchoring plan with procedures to minimize

impacts on hard bottom such as the use of midline buoys. Therefore, no cumulative impacts on geology associated with the hard-bottom resources would be expected to occur when compared with ongoing or reasonably foreseeable future offshore projects. Installation of the ports and gas transmission line in soft-bottom areas would be expected to result in short-term minor, direct impacts on sediments resulting from excavation and other disturbance during Port construction and pipeline installation. The proposed pipeline would pass through two potential sand sources identified by the Town of Longboat Key for a distance of approximately 2.26 km (1.4 mi). In addition, the proposed pipeline would pass through approximately 11.64 km (7.23 mi) of ROSS-identified potential sand source area. Based on analysis conducted in **Sections 3.4.3** and **4.4.1**, the proposed pipeline route including the 200-foot buffer on each side of the pipeline would restrict approximately 383 acres (155 hectares) for use in beach nourishment. This area comprises 0.06 percent of the 615,464 acres of the Long Boat Key, ROSS, High Volume Sand Shoal, and Borrow Area IX mapped potential sand resource areas. Elimination of the sand resource area that occurs within the new proposed alignment would be expected to result in a minor long-term impact on available sand resources. The incremental impact from installation of the ports and offshore pipeline when combined with other ongoing or reasonably foreseeable future offshore projects as presented in **Table 6.2-3** would be expected to result in a short- and long-term minor incremental contribution to cumulative impacts on geological resources.

Because of the longer pipeline distance of the Southern Site and Pipeline Route Alternative, the contribution to cumulative impacts would be somewhat greater than the Proposed Alternative. Likewise, the Offshore Interconnection with the Gulfstream Pipeline Alternative would contribute less to cumulative impacts on geological resources in the Project area due to the shorter pipeline construction and the smaller construction footprint (see **Table 2.1-5**).

Long-term, minor, direct, and adverse impacts on onshore geology and soils would be expected as a result of constructing the onshore pipeline, Port Manatee valve station, and Gulfstream and TECO Interconnection Station. Impacts on natural geologic resources would be long-term, minor, direct and adverse where HDD is used to install the pipeline and where an open cut trench method is used for the remainder of the pipeline. The HDD technique would be used to avoid coastal mangroves. Impacts on natural geologic resources would occur as a result of drilling to install the pipe under the mangroves. The drilling would occur over a short distance so impacts would be expected to be minor. The incremental impact on natural geologic resources when combined with other ongoing or reasonably foreseeable future onshore projects as presented in **Table 6.2-3** would be expected to result in short- and long-term minor cumulative impacts.

Impacts on soils would be expected as a result of potential erosion and sedimentation associated with pipeline installation and construction of the Port Manatee valve station, and Gulfstream and TECO Interconnection Station. Implementation of BMPs would minimize the potential for adverse impacts on soils resulting from erosion and subsequent sedimentation. Following pipeline installation, the disturbed soils would be restabilized with native vegetation and monitored to ensure stabilization. Increased erosion to onshore wetlands from vessel traffic from the proposed Project would be negligible to minor. The incremental impact on soils resulting from erosion and sedimentation when combined with other ongoing or reasonably foreseeable future onshore projects as presented in **Table 6.2-3** would be expected to result in short-term minor cumulative impacts because all projects would be expected to implement erosion and sedimentation BMPs.

Impacts on previously undisturbed soils would be expected to be minor because the onshore pipeline alignment and locations for the Port Manatee valve station, and Gulfstream Interconnection Station occur in areas previously disturbed by pipeline placement, agriculture, and urbanization. The impacts on previously undisturbed soils when combined with other ongoing or reasonably foreseeable future onshore

projects as presented in **Table 6.2-3** would be expected to result in long-term minor adverse cumulative effects.

6.3.5 Marine Areas and Land Use

Cumulative impacts on marine areas and land use from past and current actions in Tampa Bay and the Project area would be expected from oil and gas production activities and shipping on the OCS, and pipeline and ancillary facility construction. Cumulative impacts from future foreseeable actions would be expected from proposed onshore pipelines in the counties surrounding Tampa Bay, and from population growth and coastal development in the Tampa Bay area. Construction and operation of Port Dolphin would not add to cumulative impacts on shipping lanes, ocean dredged disposal areas, or coastal resources such as mangroves and seagrass beds. The pipeline and Port locations would be constructed on hard-bottom areas resulting in the permanent change of hard-bottom substance on the seafloor. The construction and operation of onshore aboveground facilities would disturb 13.07 acres of wetlands. The cumulative impact of the Port Dolphin construction and operation activities for all alternatives analyzed, along with other foreseeable actions in Federal waters, Tampa Bay, and Manatee County, Florida, would be expected to be minor adverse. Additionally, mitigation measures proposed in **Section 4.11**, and similar mitigation measures proposed at the other deepwater ports, are expected to minimize cumulative impacts on marine areas and land use.

6.3.6 Recreation and Aesthetics

Cumulative impacts on recreation and aesthetics from past and current actions in Tampa Bay and the Project area would be expected from temporary visual interruptions caused by transient commercial and recreational vessels. Cumulative aesthetic impacts on future residential development can be expected from clearing of onshore pipeline ROWs. The Tampa Bay area is busy with port activities from Eglin AFB, Port Manatee, Port St. Petersburg, and Port Tampa. Boat sizes range from small recreational boats to large commercial cruise boats, to loud freight carrier boats. Additional supply vessels and staff vessels traveling to and from the offshore port site are not expected to adversely impact visual resources at the port. Since the LNGCs would be similar to other commercial traffic that frequents the area, cumulative impacts from the Proposed Alternative and the other alternatives analyzed are expected to be dominated by existing activities with increases from Port Dolphin. See **Section 4.10** for a complete discussion of transportation impacts from shipping traffic.

During construction, recreational boaters in the construction area would be impacted by the noise and visual congestion of the construction of the pipeline. Construction vessels would be more visible and audible as boaters approach the project site. Visual and audible impacts from construction would result in negative aesthetic impacts on offshore recreationalists. Impacts would be moderate and short-term. Operation of the MPEH™, BOET, and onshore support services could have minor, short-term, adverse impacts on local recreational infrastructure, if they were to be built. These impacts could result from introduction of new workers and their families into coastal communities. It is anticipated that affected resources would adapt to prevent any long-term, adverse impacts. It is anticipated that operation of Port Dolphin would interact with current vessel activities to produce a long-term, minor, indirect, adverse, incremental contribution to cumulative impacts on recreational resources.

6.3.7 Air Quality

Cumulative impacts on air quality from past and present actions would be expected from offshore emissions from cargo and other vessels and onshore emissions sources from power plants and vehicles. Foreseeable future actions that are anticipated to contribute to cumulative impacts include population growth and coastal development, such as factories, which will eventually lead to more demand on

electrical power. The construction and operation of the three LNG import terminals within the cumulative geographical area of Port Dolphin (MPEH™ and BOET) and the associated pipelines are expected to contribute to minor, adverse cumulative impacts on air quality. Dispersion modeling results indicate that Port Dolphin impacts are small and decrease rapidly with distance from the buoys. The MPEH™ and BOET terminals are more than 400 km (250 mi) west of Port Dolphin, and minor impacts of air emissions from those facilities in the vicinity of Port Dolphin are expected. Since the Proposed Site and the Southern Site are only 20 miles apart, the cumulative impacts of either alternative with the MPEH™ and BOET terminals are anticipated to be minor adverse.

Two power plant expansion projects in the Tampa Bay region (i.e., Big Bend Station and Bartow Station) were noted in **Section 6.2.6**. The expansion at Big Bend Station in Hillsborough County pertains to cooling water discharge from the desalination plant. No expansion of power generating capacity at Big Bend Station has been proposed. Air emissions from this facility have been reduced in recent years as a result of installing new emissions control systems (FDEP 2008b). The repowering of Bartow Station in Pinellas County entailed the addition of a natural gas-fired simple cycle unit and a natural gas-fired combined cycle unit, with total generating capacity of 1,475 megawatts. As part of the repowering project, three residual oil-fueled electric generating units were shut down, achieving a contemporaneous net reduction in emissions of NO_x, SO_2, and particulate matter. The only criteria pollutants with potential emission increases were CO and VOC. Dispersion modeling analysis demonstrated that the predicted air quality impacts of the repowering project for CO were below the Class II Significant Impact Levels (FDEP 2008c). Predicted onshore impacts from Port Dolphin are small, and any cumulative impacts of the Port Dolphin alternatives with either of these projects are expected to be minor. Additionally, mitigation measures proposed in **Section 4.11**, such as shutting off machinery and equipment when not in use, and similar mitigation measures proposed at the other deepwater ports, are expected to minimize cumulative impacts on air quality.

6.3.8 Noise

Cumulative impacts on noise from past, present, and foreseeable future actions would be expected from ships and oil and gas production as dominant offshore noise sources, and land development, cars, and helicopters as dominant onshore noise sources. The construction of the proposed Port Dolphin, MPEH™, and BOET ports would each have short-term, minor adverse impacts on the airborne and underwater noise environments. Temporary increases in the ambient noise level would result from construction vessels and activities and would have impacts on recreational boaters and fishers operating in the vicinity of the construction areas. Temporary increases in the underwater noise levels would result from construction activities and increased traffic from construction vessels. Since Port Dolphin and MPEH™ are scheduled to begin in 2011, their construction schedules would coincide. However, MPEH™ would be built 363 miles from Port Dolphin. In addition, the construction vessels would follow different routes; vessels traveling to MPEH™ would depart from Louisiana, while vessels traveling to Port Dolphin would depart from Florida. Consequently, it is not anticipated that construction impacts from proposed LNG terminals would overlap. Proposed pipeline and electric transmission projects in the Tampa Bay area were also considered. Given the distance between the proposed pipeline and the other pipeline and transmission project, construction noise impacts are not anticipated.

Noise generated during operation of the proposed Port Dolphin, MPEH™, and BOET ports, including noise generated from SRVs, support vessel, and pilot vessels, would have a long-term, minor adverse incremental contribution to cumulative impacts on biological resources, boaters, and fishers in the vicinity. Ambient operational noise from the three ports would include regasification and offloading operations. The distance of the ports from onshore (human) noise receptors would reduce the potential for cumulative impacts on these areas. However, increased service and pilot vessel traffic would result in long-term, minor, direct, adverse impacts on these areas. Underwater operational noise from the Port

Dolphin project would include the use of thrusters to position the SRVs over the buoys and propeller cavitations while the vessel is in transit in the area. LNG regasification, natural gas offloading, and other normal vessel operations would also add to the underwater noise.

Noise from the construction and operation of Port Dolphin and from SRV traffic would add incrementally to the ambient acoustical environment in the vicinity of the Port and shipping lanes. Underwater noise impacts from ships can travel for 30 to 50 miles, although higher frequencies fade at shorter ranges (Gaul 2007). Since the existing and proposed LNG terminals within the geographic study area are farther than 50 miles away from the proposed site, it is not anticipated there would be cumulative noise impacts from LNG vessel traffic. However, the Egmont Channel, which is a shipping fairway into Tampa Bay, is adjacent to the proposed route and alternatives. During the construction phase of Port Dolphin, approximately 1,830 vessel trips would occur over an 11-month period. During the operation of Port Dolphin, there would be an increase of approximately 938 annual vessel trips in and out of Tampa Bay. Comparatively, there were about 228 vessel trips at Port Manatee and 1,858 vessel trips at Tampa Bay in 2007. Consequently, noise from Port Dolphin vessel traffic would add to the cumulative underwater noise along the proposed route and to ambient airborne noise environment within the Port Manatee and Tampa Bay region. While operations at Port Dolphin would have a long-term increase in incremental noise effects for the alternatives analyzed, each vessel would only have temporary impacts for the duration of the vessel transit and docking. Mitigation measures proposed in **Section 4.11**, such as the use of mufflers and shielding where feasible, and similar mitigation measures proposed at the other deepwater ports, are expected to minimize cumulative impacts on noise.

6.3.9 Socioeconomics and Environmental Justice

Cumulative impacts on socioeconomics and environmental justice from past, current, and reasonably foreseeable future actions in Tampa Bay and the Project area would be expected from oil and gas development, LNG import terminals, both onshore and offshore, shipping ports, and fishing industries, all of which would support local economies. Construction of Port Dolphin would employ between 50 and 100 local workers for approximately 4 months. Fabrication activities associated with the Port Dolphin project would be performed outside the United States and therefore would have no beneficial or adverse cumulative impacts. Relative to existing economic activities associated with other industries in the GOM, cumulative impacts on employment and local economic conditions from Port Dolphin would be minor, short-term, and beneficial. Since construction of the proposed Port and pipeline route would have short-term, beneficial, minor, direct impacts on local employment, there would be no disproportionately high and adverse impacts on low-income or minority populations. Cumulative impacts on socioeconomics and environmental justice from Port Dolphin construction activities are expected to be similar for all alternatives.

If the Southern Site and Pipeline Route were constructed, the total impacts on socioeconomic resources would be increased and the construction jobs and income related to construction activities would also be increased. The impact would be extremely small, as the increased length is 4 miles of additional pipeline.

Operation of Port Dolphin would have the potential to affect socioeconomic resources through increased employment, and purchase of goods and services. As discussed in **Section 2.3.5**, all functional activities would be performed onboard the SRVs. Therefore, it is estimated that operation of the Project would employ full-time administrative workers directly or through support contractors. Port Dolphin would require additional workers for the onshore portion at Port Manatee. In the event that labor forces for Port Dolphin were based in the same coastal economic area, short-term, minor, direct adverse and beneficial cumulative impacts might be expected from job growth and increased demand for goods and services. Since the combined cumulative workforce is small, it is assumed that the economy would adjust relatively quickly to the Port Dolphin project and other Tampa Bay onshore and offshore projects within the Port

Dolphin construction and operation time period, and that the additional employment, tax base, and expenditures for goods and services would result in a minor, long-term, beneficial incremental contribution to cumulative impacts on the regional economy.

There are many factors that influence catch by a commercial or recreational fishers in any given year. Some of these factors are weather, fluctuations in fish populations from natural causes (e.g., hurricanes, red tide, and hypoxia), economic conditions, and man-made incidents such as oil spills. Although the magnitude of these factors could be significant in any given year, the most influential determinant of catch volumes is state and Federal regulation. Existing fishing levels would not be impacted by operation of the deepwater ports.

Additional minor direct impacts would occur to vessels operating offshore in the GOM and Tampa Bay, including commercial fishing vessels. The size of the ATBAs relative to the open offshore waters of the GOM and Tampa Bay would require those vessels to make only minor alterations to their productive route, if any at all, to avoid the ATBAs. The possibility for shipping delays would have a slight adverse impact. SRVs would dock at the offshore port site. They would not be required to enter into the shipping lanes of Tampa Bay and St. Petersburg. Therefore, there would be no cumulative impact on the commercial shipping within Tampa Bay itself.

6.3.10 Navigation and Transportation

Cumulative impacts on navigation and transportation from past and present actions would be expected from the operation of oceangoing ships, commercial and recreational fishing, recreational boating including commercial fishing, and other vessels in the GOM. Cumulative impacts from foreseeable future actions would be expected from the additional LNGCs and service vessel traffic from deepwater ports like BOET. Construction of Port Dolphin would increase the number of construction and service vessels operating for a short timeframe (11 months). Operations would require service vessels for maintenance and SRV resupply which could result in increased risks of collisions or other mishaps.

Construction and operation of MPEH™ and BOET would also increase the number of LNGCs operating in the GOM, but service vessels would likely come from different places since MPEH™ and BOET are closer to Louisiana than Florida. Overall, the incremental contribution of Port Dolphin to the cumulative impacts on navigation and safety would be minor compared to the existing levels of commercial, recreational, fishing, military, and oil and gas exploration and development traffic in the GOM.

6.3.11 Public Safety

Based on the Independent Risk Assessment (IRA) conducted by AcuTech (see **Appendix J**), the probability of an LNG release is very low. Furthermore, because of the Port's distance from the shoreline and shipping lanes, the impact of a release on public safety is characterized as minor. The most extreme credible modeling scenario presented in the IRA identified a potential maximum hazard radius of approximately 4,500 m (2.8 mi) around each buoy while occupied by an SRV.

Operation of any deepwater port in the GOM would, by default, increase overall LNG accident probability from the current levels, but there would be no cumulative contribution to the modeled extent or magnitude of any credible LNG accident scenario from the operation of Port Dolphin. By definition, increased risk probability would have a minor, long-term, adverse impact on public safety in the vicinity of the Port. Because the ports would not share any resources that could be impacted by a credible unintentional LNG release scenario, there would not be cumulative public safety impacts on any one resource.

While public safety concerns might have minor, long-term, adverse or beneficial impacts on the decisionmaking process of potential future proposals within the hazard area, there is no direct short-term or long-term adverse impact outside the hazard area modeled by AcuTech. Cumulative impacts on public safety are expected to be minor adverse for all alternatives analyzed. Additionally, safety and security mitigation measures proposed in **Section 4.11** through vessel design criteria, operational procedures, and the imposition of restricted areas, and similar mitigation measures proposed at the other deepwater ports, are expected to minimize cumulative impacts on public safety.

6.4 Unavoidable Impacts

Unavoidable impacts are those impacts that would result from the Proposed Action or any alternatives that cannot be mitigated. These impacts might be beneficial or adverse in nature, and be short- or long-term in duration.

6.4.1 Water Quality

Routine offshore operations would have unavoidable effects to varying degrees on the quality of the surrounding water if the proposed projects are implemented. Port construction and pipe-laying activities would cause minor, short-term localized impacts on turbidity of affected waters for the duration of activity periods. Cooling water discharge, in accordance with appropriate laws, would have a minor, long-term impact on water quality. Accidental spills from the proposed terminals, other OCS activities, and vessels would result in increases in pollutant levels in the water column. These impacts would generally be short-term, but minor or major, depending on the size of the spill. Vessel traffic would contribute to cumulative degradation of GOM waters through inputs of chronic oil leakage, treated sanitary and domestic waste, bilge water, and contaminants known to exist in ship paints. Construction of the onshore pipelines would result in short-term, minor adverse impacts on water quality with adherence to all BMPs, recommended mitigation measures, and applicable laws and regulations.

6.4.2 Biological Resources

Unavoidable effects on threatened and endangered marine mammals, including sea turtles, fish, and migratory birds could result from construction and operation of the proposed Port and pipeline, and vessel traffic. Marine animals would be affected by noise and disturbances associated with offshore activities. Losses to fishing resources could occur from placement of the proposed pipelines. These impacts would be minor and would not jeopardize the population. Localized populations of fish species would be expected to be impacted; however, these impacts are not expected to result in population-level effects. Construction of the onshore pipeline would have short-term, adverse impacts on vegetation. However, vegetation would be expected to quickly become reestablished. Modification of vegetation type would displace any wildlife species inhabiting the area, and would be considered a long-term, adverse impact. However, none of the species that would be impacted are protected.

6.4.3 Cultural Resources

Offshore Components. Construction of the proposed pipelines might result in the loss of unique or significant archeological information. MMS-required archeological surveys significantly lower the potential for the loss of resources by identifying potential archeological sites prior to construction, thereby making avoidance or mitigation of impacts possible. Offshore, in areas of high sedimentation rates, however, survey techniques might not be effective in identifying a potential resource. Any unanticipated impacts on cultural resources during the construction of subsea or onshore pipelines would be adverse, long-term, and cumulative.

The applicant has proposed potential measures for mitigating or minimizing impacts on cultural resources (see **Section 4.11.1**).

A stand-alone "Unanticipated Discoveries Plan – Cultural Resources, Port Dolphin LLC, Deepwater Port and Proposed 36-Inch Gas Pipeline, St. Petersburg Area Block 545 to Tampa Bay, Florida" has been developed by the applicants in accordance with Sections 106 and 110 of the NHPA, MMS guidelines, and the applicable statutes of the State of Florida concerning offshore cultural resources (see **Appendix I**). In the event of unanticipated discovery of cultural resources, Port Dolphin would follow the plan, which was submitted to the USCG in August 2007. All activity in the area of work would be halted immediately, and an avoidance zone of at least 1,000 feet for further work in that area would be established. Within 48 hours of the discovery, the Regional Supervisor, Leasing and Environment, and archaeologists at the MMS office in New Orleans, as well as the USCG and the appropriate Florida SHPO with the FDHR would be notified. Implementation of the plan is necessary to avoid adverse direct, indirect, or cumulative impacts on historic properties. The plan would become a part of any license issued.

***Onshore Components*.** There would be no impact on cultural resources provided that an archeological survey of any unsurveyed portions of the route is performed prior to construction, and all identified historic properties are avoided with proper buffer distances.

6.4.4 Geological Resources

Unavoidable disturbance of surficial sediment or soils would occur during installation of the proposed Port and pipeline. Installation of the mooring lines and anchors would directly affect 0.56 acres (0.22 hectares) of sediment and 0.032 acres (0.012 hectares) of hard bottom. Construction of the offshore pipeline would disturb a total area of 40.87 acres (16.54 hectares) of seafloor, including 18.03 acres (7.29 hectares) of hard bottom. Approximately 45 acres (20 hectares) of soils would be temporarily impacted during the construction of the onshore segment of the pipeline.

6.4.5 Marine Areas and Land Use

Construction and operation of the Port and pipeline would have unavoidable impacts on hard-bottom habitat areas offshore. Under the DWPA implementing regulations, the USCG is authorized to establish a permanent mandatory Safety Zone. If a License is issued, the USCG may designate a mandatory NAA and recommendatory ATBA to further facilitate Port operations, safety, and security. Operation of the onshore pipeline and facilities in Manatee County, Florida, would permanently impact wetland resources, and limit construction within the permanent pipeline easement. Aboveground facilities would reduce industrial space available for future development.

6.4.6 Recreation and Aesthetics

Creation of a Safety Zone in the vicinity of the proposed Port would result in limited displacement of commercial and recreational fishing during the period the proposed deepwater Port would be licensed for operations. The minor, but long-term, effects on fishing would be unavoidable because of the need to ensure safety at the facilities.

6.4.7 Air Quality

Routine offshore operations would have minor unavoidable effects on air quality of the region surrounding the Port if the proposed projects are implemented. Port construction and pipe-laying activities would cause minor, short-term localized impacts on air quality for the duration of construction activity. Routine operation of the interconnection station would have insignificant effects on air quality;

operation of the emergency standby generator could cause significant temporary impacts in the immediate vicinity of the station. Construction of the interconnection station would also cause major, short-term, localized impacts on air quality. By making natural gas more available and more competitive with other fossil fuels, the project could have potentially beneficial impacts on regional air quality by reducing reliance on coal and oil, and the higher emissions associated with those fuels.

6.4.8 Noise

Effects on the marine noise environment, caused by construction of the proposed Port and pipeline, would be unavoidable. These noise sources would have minor, long-term cumulative impacts relative to existing and anticipated OCS activities. Construction of the onshore portion of the pipeline would have short-term, minor impacts from noise produced by construction equipment.

6.4.9 Socioeconomics and Environmental Justice

Construction of proposed Port facilities would have unavoidable, short-term, beneficial impacts on jobs, and indirectly on the purchase of goods and services. Operation of Port Dolphin would have long-term, beneficial impacts on jobs, and indirectly on the purchase of goods and services for the 25-year life of the project. Construction and operation of the onshore portion of the pipeline would have a beneficial impact on the local economy. Impacts would be both short- and long-term, but minor. Since construction of the proposed Port and pipeline route would have short-term, beneficial, minor, direct impacts on local employment, there would be no disproportionately high and adverse impacts on low-income or minority populations.

6.4.10 Navigation and Transportation

Construction and operation of the proposed Port would have unavoidable, short-term, minor, direct, and adverse impacts on offshore transportation. Construction of the onshore pipelines might have minor, short-term, localized impacts on transportation. Construction vehicles would cause congestion on roadways while transporting supplies and equipment. Transportation could also be temporarily detoured or stopped in areas where pipelines would cross roads.

6.4.11 Public Safety

The proposed LNG Deepwater Port operations would have an unavoidable long-term adverse effect on public safety within the hazard area. All related reliability and safety issues can be identified and avoided with development and implementation of appropriate risk management plans. There are potential unavoidable reliability and safety impacts inherent in any offshore activity due to unpredictable and unexpected acts of man and nature (e.g., accidents, terrorism, storms).

6.5 Irreversible and Irretrievable Commitment of Resources

An irreversible or irretrievable commitment of resources refers to impacts on or losses to resources that cannot be reversed or recovered, even after an activity has ended and facilities have been decommissioned. This differs from unavoidable impacts which might be short-term or long-term in nature. A commitment of resources is related to use or destruction of nonrenewable resources, and effects that loss would have on future generations. For example, if a species becomes extinct as a result of a Proposed Action, the loss is permanent. If prime farmland is converted to a residential or commercial development, there is permanent loss of agricultural productivity. Chronic, low-level pollution can injure and kill organisms at virtually all trophic levels. Mortality of individual organisms can be expected to occur, and possibly a reduction or even elimination of a few small or isolated populations. Construction

and operation of the Port involves the irreversible and irretrievable commitment of material resources and energy, land and wetland resources, and biological resources. The impacts on these resources would be permanent.

Material resources used for the proposed Port include building materials for new structures and other equipment. Steel might be recyclable after Port decommissioning. No supplies are considered scarce, and would not limit other unrelated construction activities in the region. Construction of the proposed Port would also require use of fossil fuels, a nonrenewable natural resource.

Construction and operation of the proposed Port would result in an irreversible or irretrievable loss of some biological resources. Irreversible impacts would include a conversion of limestone outcroppings to other hard materials, resulting in the loss of benthic fish habitat. The use of seawater as cooling and ballast water for LNG vaporization would also cause the irreversible or irretrievable loss of EFH. There would also be a permanent change inland use for the aboveground facilities onshore, along with the permanent ROW. Open trenching through wetland areas would permanently change the value of those wetland areas. Irreversible losses might also include the loss of various terrestrial organisms during pipeline construction, loss of marine animals in the unlikely event of an LNG spill, and loss of sea turtles or marine mammals due to ship strikes. Some normal and required operations, such as structure removal done in accordance with applicable laws and regulations, can result in the destruction of viable marine life. Although the possibility exists that individual marine mammals, marine turtles, birds, and fish can be injured or killed, there likely would not be a lasting effect on baseline populations.

Although the effect on archeological resources from constructing the proposed Port is expected to be low, any interaction between an impact-producing factor (e.g., placement of new structures and laying of a pipeline) and a significant historic shipwreck or prehistoric site could destroy information contained in site components and their spatial distribution. This could cause a permanent loss of potentially unique archeological data.

6.6 Relationship Between Short-Term Uses and Long-Term Productivity

Short-term refers to the total duration of installation and at-sea construction of the proposed Port, and offshore and onshore pipeline. Long-term refers to an indefinite period following decommissioning of the proposed Port, pipelines, and other associated facilities. According to MMS, the short-term uses of the environment, and the cumulative development of OCS oil and gas resources in the GOM are compatible with the maintenance of long-term productivity of the OCS. Unavoidable adverse impacts are anticipated to be primarily short-term and localized in nature (MMS 2002a).

Short-term project operational activities might result in chronic impacts over a longer period. Installation and eventual removal of new structures would cause minor, localized impacts in the short-term; impacts of site clearance and decommissioning might last longer because of minor elements that would be left in place. Short-term use might have long-term impacts on biologically sensitive offshore areas or archeological resources. Upon completion of DWPA licensed activities, the marine environment would generally be expected to remain at or return to its normal long-term productivity levels.

No long-term productivity or environmental gains are expected as a result of the DWPA development of the OCS. Benefits of the Proposed Action are expected to be principally those associated with an increase in supplies of natural gas for domestic consumption. While no reliable data exist to indicate long-term productivity losses as a result of use of the OCS, such losses are possible.

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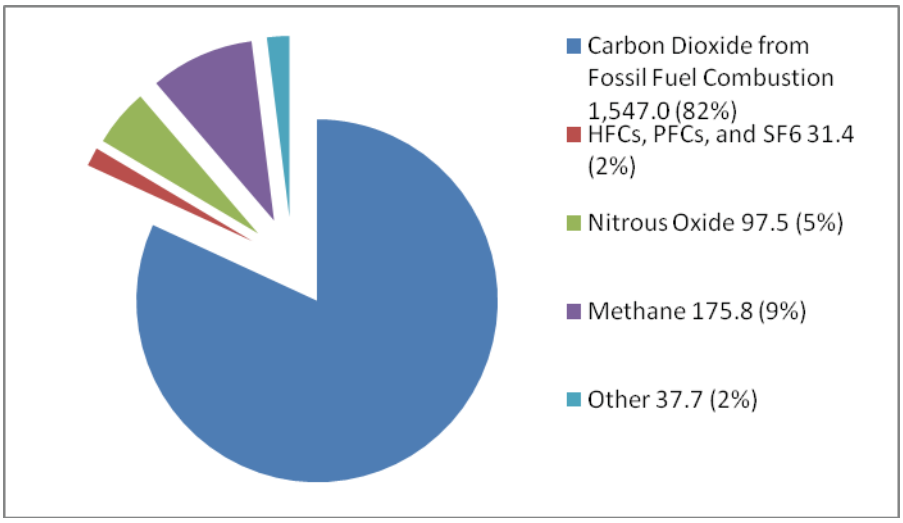
7. Greenhouse Gases

Many chemical compounds found in the Earth's atmosphere act as "greenhouse gases." These gases allow sunlight to enter the atmosphere freely. When sunlight strikes the Earth's surface, some of it is reflected back towards space as infrared radiation (heat). Greenhouse gases absorb this infrared radiation and trap the heat in the atmosphere. Without this natural greenhouse effect, temperatures on earth would be much lower.

An increase of greenhouse gas emissions (GHG) from anthropogenic (man-made) sources since the beginning of industrialization has been shown to correlate with an increase in global average temperature. This has led to concerns that the global climate is changing. The concern is that higher levels of GHGs in the atmosphere and the resultant increase in trapped heat results in the phenomenon of global warming.

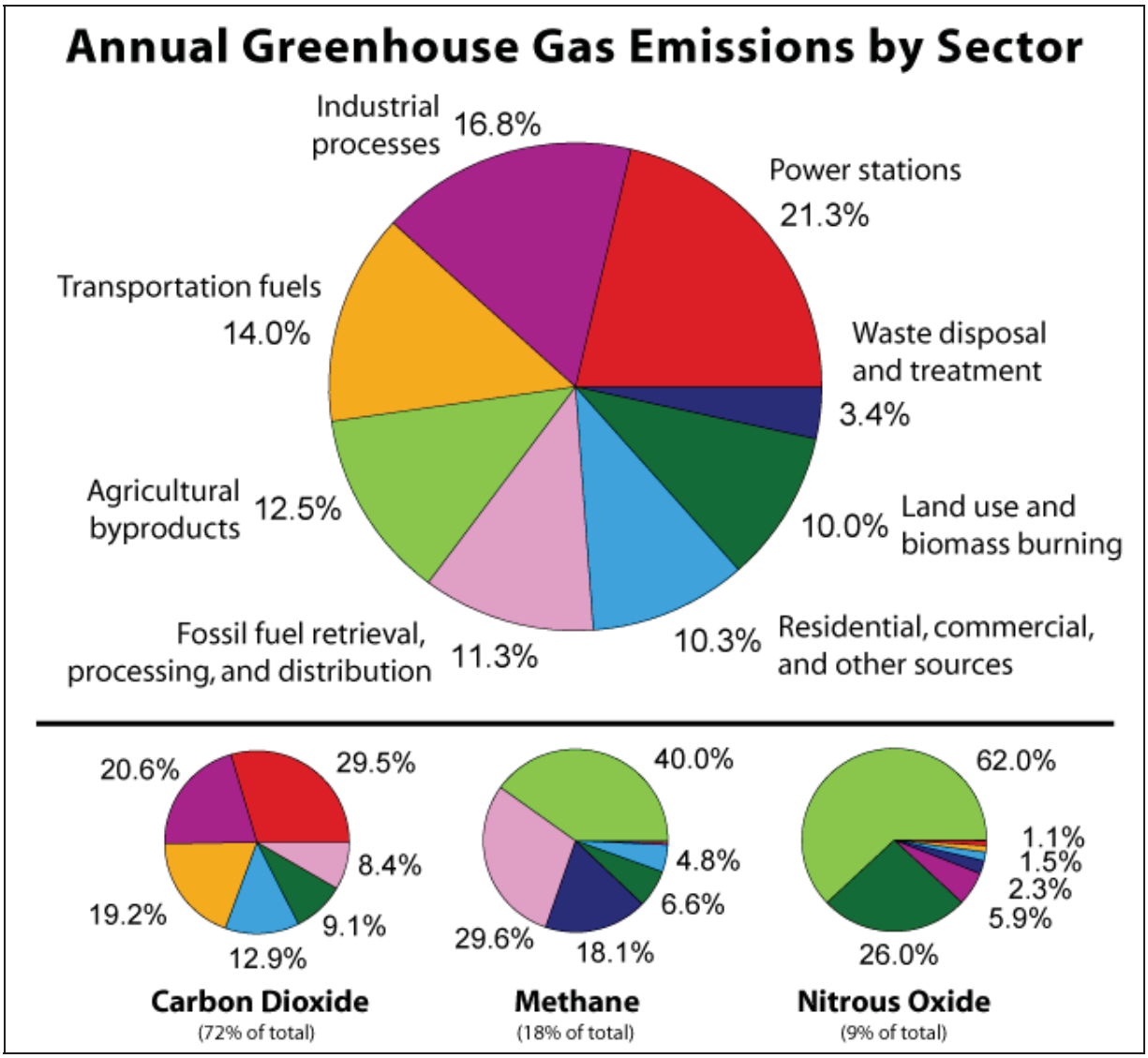
Many gases exhibit these "greenhouse" properties. The majority of greenhouse gases come mostly from natural sources including carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Human activity also contributes to GHG emissions and includes compounds that are not naturally emitted, such as halocarbons (compounds of carbon with fluorine, chlorine, bromine, or iodine) and sulfur hexafluoride (SF_6), and estimated emissions from the United States are shown in **Figure 7.0-1**. It is not possible to state that a specific gas causes a certain percentage of the greenhouse effect because the influences of the various gases are not additive.



Source: EIA 2003

Figure 7.0-1. Greenhouse Gas Emissions Sources

Figure 7.0-2 displays the annual GHG by sector in the United States. Since the USEPA has not promulgated an ambient standard or *de minimis* level for CO_2 emissions for Federal actions, there is no standard value to compare an action against in terms of meeting or violating the standard. The proposed Project would contribute directly to emissions of greenhouse gases from the combustion of fossil fuels for the transportation of the LNG to the Port site in the SRV, the combustion of natural gas for vaporization of the LNG and from generation of electric power used to power the vaporization and send-out of the vaporized natural gas.



Source: Rosmarino 2006

Figure 7.0-2. Annual Greenhouse Gas Emissions by Sector

The potential effects of a change in atmospheric concentration of greenhouse gases on global climate has been studied extensively and reported by the Intergovernmental Panel on Climate Change (IPCC). The IPCC has released a series of reports. The most recent is the Fourth Assessment Report (Forster et al. 2007). Since GHGs are emitted by every country and because the potential impacts of climate change would be felt worldwide, climate change is a global issue. IPCC reports have documented a wide range of potential impacts including sea level rise, changes in weather patterns, and changes in temperature and moisture distributions. These changes can then produce related changes in biological communities on land and in the oceans.

Studies were also conducted by the U.S. Global Change Research Program (USGCRP) focusing on the GOM (Ning et al. 2003). This integrated assessment of climate change on the GOM concluded that climate change could have a wide range of impacts from fisheries to coastal ecosystems due to changes in salinity and temperature and by habitat changes.

Greenhouse Gas Regulations and NEPA Requirements. Currently there are no climate change regulations controlling or requiring a permit for emissions of GHG. Other CAA requirements indirectly limit or prohibit emissions of some GHG. Use of halocarbons is regulated under Title VI of the CAA. NO_2 is regulated under Title I, and control of NO_2 indirectly reduces other nitrogen oxides compounds, including N_2O.

In April 2007, the U.S. Supreme Court declared that CO_2 and other greenhouse gases are air pollutants under the CAA. The Court declared that the USEPA therefore has the authority to regulate emissions of CO_2 and other greenhouse gases. However, EPA has not subjected GHGs to regulation under the Clean Air Act. In December 2007, the U.S. Congress required USEPA to promulgate a national GHG reporting regulation and create a GHG registry. Final rules are not due until 2009.

The overall goal of an EIS being prepared under NEPA is to take a hard look at environmental issues that are known or emerging regardless of whether rules have been promulgated to regulate the issue. Climate change and the emissions of GHG are in the forefront of environmental issues being examined around the world. The importance of examining the GHG and climate change issues in an EIS was recently stressed in a court ruling that emphasized the NEPA goal of taking a hard look at GHG and Climate Change issues in more depth to allow decisionmakers to include consideration of these issues in their decisions (U.S District Court of Appeals, Ninth District, Center for Biological Diversity v. National Highway Traffic Safety Administration, November 15, 2007).

Estimating Project GHG Air Emissions Inventory. Both USEPA and DOE have emissions factors for CO_2 and methane (CH_4). USEPA's factors are documented in different chapters of its AP 42 *Compilation of Air Pollutant Emission Factors* (USEPA 2000). DOE's factors are presented in "Technical Guidelines Voluntary Reporting of Greenhouse Gases (1605(b)) Program, January 2007." The CO_2 emissions based on USEPA and DOE factors are very close (within 10 percent difference). USEPA and DOE factors for CH_4 are quite different; the DOE factors are more industry-specific. Some of the DOE factors are cross-referenced to data published by IPCC. This indicates that DOE has also adopted a global approach for the greenhouse gas issue. Based on these considerations, DOE factors for CO_2 and CH_4 have been chosen for this analysis.

Project GHG. The United States currently receives about 3 percent of its natural gas from overseas via LNG tankers. Another 17 percent is imported from Canada through pipelines. The remaining 80 percent is produced domestically and is currently declining in overall production. It is anticipated that natural gas imports will rise to 30 percent of overall U.S. consumption by 2030. The Port would import a daily average of 800 MMscfd of natural gas or less than .0004 percent of U.S. consumption in 2005 (EIA 2007b) and 18.6 percent of current Florida natural gas consumption (Port Dolphin 2007b).

Construction emissions would be generated by onshore pipeline and interconnection construction, offshore pipeline construction, and construction of the STL buoys. Emissions sources include the following construction equipment: a pipelay/derrick barge, AHTS vessel, crew boat, diving barges, jack-up barge, pipe burial barge, dragline, pipe pull barge, and supply boat. Onshore pipeline construction would involve trenching and backfill equipment, pipe-handling equipment, welding equipment and generators, and supply and support vehicles. During the construction of the Port and pipeline, different tasks would require the use of a variety of vessels and each vessel would contribute to the total air emissions. The main sources of emissions during construction would be the diesel engines used onboard each vessel for propulsion and electricity generation. **Table 7.0-1** presents the total emissions of CO_2 and CH_4 from construction activities.

Table 7.0-1. Estimated Greenhouse Gas Emissions During Construction (Proposed Route)

Construction Phase	CO_2 Emissions (tons)	CH_4 Emissions (tons)
Offshore Pipeline	72,215	16.5
STL Buoys	8,085	1.8
Onshore construction	158	86.6
Total Construction	80,458	105

Emissions of CO_2 and CH_4 from operational activities include power generation and propulsion engines and vaporization steam boilers, support vessel emissions, and minor emissions associated with the onshore portions of the Project. **Table 7.0-2** summarizes the CO_2 and CH_4 emissions during routine operations. Combustion of natural gas in boilers and internal combustion engines is highly efficient; emissions of unburned methane are lower than emissions of CO_2 by more than a factor of 1,000.

Table 7.0-2. Operations Emissions of Greenhouse Gases

Operations Phase	CO_2 Emissions (tons/yr)	CH_4 Emissions (tons/yr)
Port	718,642	586
Onshore pipeline	25	< 0.01
SRV Transit	16,135	13
Total Operations	734,802	599

Decommissioning of the deepwater Port will generate CO_2 and CH_4 emissions from the vessels associated with this event; decommissioning of onshore equipment will include the release of residual natural gas (largely CH_4) from the pipeline. **Table 7.0-3** summarizes the emissions, including dive barges, equipment-removal vessels, trucks, and equipment to remove aboveground components onshore, and support vessels.

Table 7.0-3. Estimated Greenhouse Gas Emissions During Decommissioning (Proposed Route)

Decommissioning Phase	CO_2 Emissions (tons)	CH_4 Emissions (tons)
Offshore	2,538	0.6
Onshore	21	1299.7
Total Decommissioning	2,559	1300

Project GHG Emissions Compared to Florida Baseline, and United States Baseline. The FDEP estimated the state's GHG in a September 2007 report entitled "Preliminary Inventory of Florida Greenhouse Gas Emissions: 1990-2004." The results of the inventory are expressed in $MMTCO_2E$ for a number of economic sectors including the Energy sector. Estimated emissions of CO_2 from the State of Florida for 2004 were 258 million metric tons, and total Florida GHG emissions in 2004 were 289 $MMTCO_2E$. Therefore, the expected GHG emissions from operation of the Port, 0.9 $MMTCO_2E$, represent less than 1 percent of the existing GHG for Florida. Estimated national emissions of CO_2 for the U.S. were 5,957 million metric tons in 2004, and total GHG emissions were 7,133.5 $MMTCO_2E$. Approximately 83.5 percent of these emissions represent CO_2 emissions from combustion of fossil fuels (USDOE 2006).

No Action Alternative. As discussed in **Section 1.2**, natural gas used for power generation would displace other fuels, including coal and fuel oil, for generation. If the license is denied, then alternative sources of energy would replace the natural gas that would have been provided by the Project. The current fuel mix for power generation in the Tampa Bay area relies heavily on coal and fuel oil. If the natural gas is replaced by a fuel mix similar to the current fuel mix, then additional emissions of GHG would result. Natural gas is a preferred option for power generation when considering GHG and other pollutant emissions. **Table 7.0-4** compares fossil fuel emissions in pounds per billion Btu of Energy Input for natural gas, oil, and coal.

Table 7.0-4. Estimated Fossil Fuel Emissions (in pounds per billion Btu)

Pollutant	Natural Gas	Oil	Coal
Carbon Dioxide	117,000	164,000	208,000
Nitrogen Oxides	92	448	457

Assuming an average heat content of 1,020 Btu/scf for delivered natural gas and 7,600 Btu/KWh for electricity generation by natural gas, this is enough gas to generate approximately 39.2 million MWh per year. Comparison of the CO_2 emissions for equivalent electrical generation from the current fuel mix in the Tampa Bay area to emissions for the same power generation using natural gas shows that an additional 10.8 million metric tons per year would be emitted if the Project's natural gas were not available to generate electrical power (Port Dolphin 2008a).

Project Alternatives. The Southern Route Alternative for the pipeline is longer than the Proposed Route. Emissions during construction and decommissioning would therefore be greater for this alternative, compared to the Proposed Route. Emissions of CO_2 and CH_4 for pipeline construction would be about 12 percent higher for the Southern Route Alternative, compared to the Proposed Route. Similarly, the CH_4 release associated with decommissioning would be larger for the Southern Route Alternative.

The Offshore Interconnection Alternative for the pipeline is shorter than the Proposed Route. Emissions during pipeline construction and decommissioning would therefore be lower, compared to the Proposed Route. Emissions during construction of the offshore interconnect are expected to be higher, compared to the onshore interconnection station. On balance, total GHG emissions during construction of the pipeline plus interconnection could be higher, lower, or about the same as the Proposed Action. With no onshore interconnection station, GHG emissions during operation of the Port would be slightly lower for this alternative,

For the FSRU and AAV Alternative, more construction would be required at the Port for the FSRU than for the proposed action, leading to more GHG emissions. During operation of the Port, the AAV has potentially lower emissions for the vaporization of the LNG; however, any reduction in GHG emissions related to AAV is small, compared to the potential increase in mobile source emissions related to docking at the FSRU. Therefore, potential impacts from operation could be greater or less than the proposed action. For decommissioning, emissions to remove the FSRU are expected to exceed those associated with the Proposed Action.

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This EIS has been prepared under the direction of HQ USCG and the Maritime Administration. FERC, USACE, NOAA, MMS, USFWS, and USEPA have joined USCG and the Maritime Administration as cooperating agencies in the preparation of this EIS. The individuals who assisted in providing data to facilitate the development of the EIS, participated in reviews, and otherwise provided valuable direction for the preparation of this document are listed below.

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