DEEPWATER PORT LICENSE APPLICATION FOR THE BLUEWATER SPM PROJECT

VOLUME II – ENVIRONMENTAL EVALUATION

Section 14 – Navigation, Safety, and Security

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LIST OF ACRONYMNS

72 COLREGS	Convention of the International Regulations for the Preventing of Collisions at Sea of 1972
AIS	Automatic Identification System
AMS	Area Maritime Security
AOR	Area of Responsibility
API	American Petroleum Institute
Applicant	Bluewater Texas Terminal LLC
ATBA	Area to Be Avoided
ATN	Aids to Navigation
bbls	barrels
BOEM	Bureau of Ocean Energy Management
bph	barrels per hour
bph	barrels per hour
BSEE	Bureau of Safety & Environmental Enforcement
BWTT	Bluewater Texas Terminal LLC
CALM	Catenary Anchor Leg Mooring
CCSC	Corpus Christi Ship Channel
CERCLA	Comprehensive Environmental Response Compensation and Liability Act of 1980
CERFA	Community Environmental Response Facilitation Act
CFR	Code of Federal Regulations
COC	Certificate of Compliance
COI	Certificate of Inspection
COLREGs	Convention on the International Regulations for Preventing Collisions at Sea, 1972
COTP	Captain of the Port
DWP	Deepwater Port
DWPA	Deepwater Port Act of 1974, as amended
DWPL	Deepwater Port License
DWT	Dead weight
e.g.	exempli gratia [Latin for 'for example']
EIA	Energy Information Administration
EIS	Environmental Impact Statement
FSP	Facility Security Plan
ft.	feet
GIWW	Gulf Intracoastal Waterway
GOM	Gulf of Mexico
gpm	gallons per minute
HDD	horizontal directional drilling
Hp	horsepower
IACS	International Association of Classification Societies
IG	Inert gas
ILO	International Labor Organization
IMO	International Maritime Organization
ISCC	International Ship Security Certificate
ISM	International Safety Management Code
ISPS	IMO International Ship and Port Facility Security Code
km	kilometer
m	meter

MARAD	Maritime Administration
MARPOL	The International Convention for the Prevention of Pollution from Ships,
MARSEC	U.S. Coast Guard Maritime Security
MHT	Mean High Tide
MISLE	Marine Information for Safety and Law Enforcement
MLLW	Mean Lowest Low Waterline (tidal reference)
MT	Metric ton
MTMSA	Marine Terminal Management and Self-Assessment
MTOCT	Marine Terminal and Operator Competence Guide
MTSA	Maritime Transportation Security Act
NAA	No Anchoring Area
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
nm	nautical miles
OCIMF	Oil Companies International Marine Forum
OCS	Outer Continental Shelf
OSHA	Occupational Health and Safety Administration
PHMSA	Pipeline and Hazardous Materials Safety Administration
P&I Club	Protection and Indemnity Club
PLEM	Pipeline End Manifold
POCC	Port of Corpus Christi
ppm	parts per million
Project	Bluewater SPM Project
RACON	radar beacon
RCRA	Resource Conservation and Recovery Act of 1976
ROV	remotely operated vehicle
ROW	Right of Way
SDS	Safety Data Sheet
SDWA	Safe Drinking Water Act
SIRE	Ship Inspection Report Programme
SOLAS	International Convention for the Safety of Life at Sea
SPCC	Spill Prevention, Control, and Countermeasure Plan
SPM	Single Point Mooring
UKC	Under-keel clearance
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USDOT	United States Department of Transportation
VHF	Very High Frequency
VIS	Vessel Information System
VMS	Vessel Management System
VTS	Vessel Traffic Service

14 Navigation, Safety, and Security

This section discusses the navigation, safety and security risks and the anticipated impacts through construction, operation, and decommissioning of the Proposed Project and the Alternative Project. The detailed description of the Proposed Project Area and Alternative Project Area and the framework for the evaluation of environmental impacts is provided in Section 3 of Volume II.

Navigation refers to ascertaining a vessel's position and the planning and following a route. This section aims to identify and analyze the existing routes, casualty and traffic data, and navigation trends within the vicinity of the Proposed Project and Alternative Project, and to anticipate the impacts, such as collision, loss of containment, and loss of stability. During operation, the discussion around navigation is primarily offshore. Inshore navigation is discussed during construction and installation of the pipelines. Onshore areas are not relevant in the navigation discussion.

The storage, transport and transfer of crude oil through pipelines and offshore oil tankers require safety and security risks that must be identified and addressed by the Project. This section provides a discussion on the safety and security concerns specific to the Proposed Project and Alternative Project Areas. Safety of personnel working at the proposed deepwater port (DWP) via support vessels will be fully addressed in the approved Operations Manual and Safety Manual and is outside the scope of this document.

14.1 Applicable Laws and Regulations

This section outlines the regulations that govern navigation, safety and security and provides a list of applicable regulations under the Deepwater Port Act of 1974, as amended (DWPA).

The DWP is in the jurisdictional area of responsibility (AOR) of the United States Coast Guard (USCG) Sector Corpus Christi. Safety and Security of the DWP will be managed in accordance with all applicable International, federal, and regional regulations. A Safety Management System will be developed and utilized, in accordance with Occupational Health and Safety Administration (OSHA) regulations, and Oil Companies International Marine Forum (OCIMF) guidelines to ensure that certification, training and maintenance records are kept up to date.

This section provides a discussion of applicable regulations, industry best practices and international rules as a baseline for ensuring safe operations of the DWP. A comprehensive list of governing laws and regulations for the Project is in Volume II, Appendix B.

14.1.1 Deepwater Port Act of 1974

The DWPA, as amended, establishes a licensing system for ownership, construction, operation and decommissioning of deepwater port structures located beyond the U.S. territorial sea for the import and export of oil and natural gas. The DWPA sets conditions that deepwater port license applicants must meet, including minimization of adverse impacts on the marine environment and submission of detailed plans for construction, operation and decommissioning of deepwater ports. The DWPA also requires detailed procedures for the issuance of licenses by the Secretary of Transportation (Secretary) and the Secretary is required to establish environmental review criteria consistent with the National Environmental Policy Act (NEPA). On June 18, 2003, the Secretary authorized the Maritime Administrator to "carry out the following powers and duties and exercise the authorities vested in the Secretary by the Deepwater Port Act of 1974".[1]

[1] Public Law 93–627, as amended (33 U.S.C. 1501 et seq.)" (68 FR 36496).

- The Maritime Administration (MARAD) is responsible for evaluating and for either issuing or denying the deepwater port license. The various other duties under the DWPA, including consultation, are shared with the U.S. Coast Guard.
- The USCG manages the development of the Environmental Impact Statement for compliance with the National Environmental Policy Act of 1969 (NEPA).
- The USCG develops guidance for oversight of post-licensing activities associated with the development of Deepwater Ports including the design, construction and commissioning phases, environmental monitoring programs, operational procedures, risk assessments, security plans, safety and inspections.
- The USCG maintains and updates the regulations for Deepwater Ports, 33 Code of Federal Regulations Subchapter NN, (33 CFR Parts 148, 149, 150). This section pertains to the navigation, safety and security risks, laws, and regulations under the MARAD deepwater ports regulations in 33 CFR Subchapter NN.
- Tankers calling at the DWP will be governed under the USCG's Certificate of Compliance for Foreign Flagged vessels, as well as the international regulatory framework. As a specialized agency of the United Nations, the International Maritime Organization (IMO) is the global standard-setting authority for the safety, security and environmental performance of international shipping. Its main role is to create a regulatory framework for the shipping industry that is fair and effective, universally adopted and universally implemented.

14.1.1.1 33 CFR Subchapter NN Deepwater Ports

The Federal regulations applicable to DWPA provide "requirements for the establishment, restrictions, and location of safety zones, no anchoring areas (NAAs), and areas to be avoided (ATBA) around deepwater ports."

The specific requirements are described in Title 33 of the CFR (33 CFR) Subchapter NN:

- Subpart D, Vessel Navigation
- Subpart J, Safety Zones, NAA, and ATBA (Part 150.900) (33 CFR 150.900)

These rules address the "vessel navigation and activities permitted and prohibited at deepwater ports" and apply to safety zones, NAAs, ATBAs, and their adjacent waters. The rules supplement the 72 COLREGS.

14.1.1.1.1 SUBCHAPTER J SAFETY ZONES, NO ANCHORING AREAS, AND AREAS TO BE AVOIDED

(33 CFR §150.900-§150.940)

Under 33 CFR 150.940, no vessel or person will be allowed to enter the area encompassed by the safety zone without the express permission of the USCG Captain of the Port (COTP) who has jurisdiction over the area. The DWP regulations allow the person in charge of the DWP to manage traffic within the safety zones. The Safety Zone regulation is enforceable, with a civil penalty for violations, simply by making vessel operators aware of it. No physical USCG police presence is required.

14.1.1.1.2 SUBPART E AND H - AIDS TO NAVIGATION

(33 CFR §§ 149.500 - 149.585 and §§150.700-150.720)

The rules in Title 33, Federal CFR, (33 CFR Part 149 Subpart E), prescribe the aids to navigation (ATN) requirements for DWPs; 33 CFR Chapter I, Subchapter NN Deepwater Ports, Subpart H, provides requirements for the operation of ATN at a DWP.

In general, the rules call for marking the fixed platforms, SPMs, floating transfer hoses, and installing radar beacons and sound signals on the main platform. The rules also prescribe standards for optional aids, primarily buoys, which might be used to mark maneuvering lanes and the anchorage.

14.1.1.1.3 SUBPART D VESSEL NAVIGATION (33 CFR §150.300-§150.385)

This subpart supplements 72 COLREGS and prescribes requirements that apply to the navigation of all vessels at or near a DWP; and, apply to all vessels while in a safety zone, area to be avoided (ATBA), or no anchoring area. The subpart sets requirements for radar surveillance and details when radar surveillance is required.

14.1.2 Convention on the International Regulations for Preventing Collisions at Sea, 1972

The Convention of the International Regulations for the Preventing of Collisions at Sea of 1972 (72 COLREGS) are the international "Rules of the Road" when it comes to navigation of ships.

The International Rules (33 CFR Chapter 30) were formalized in the 72 COLREGS and became effective on July 15, 1977. The current edition of the COLREGS was adopted in 1972 but the Rules have been amended several times since.

72 COLREGS is divided into 6 parts: Part A – General; Part B – Steering and Sailing Rules; Part C – Lights and Shapes; Part D – Sounds and Light Signals; Part E – Exemptions; and, the recently added (January 2016), Part F – Verification of Compliance.

72 COLREGS is applicable to all vessels on waters outside of established navigational lines of demarcation, known as 'COLREGS Demarcation Lines'. COLREGS Demarcation Lines generally run between major headlands and prominent points of land at the entrance to coastal rivers and harbors. Within the vicinity of the Project, the COLREGS Demarcation Line follows near the shoreline. As a result of this, all Project vessels transiting to and from the DWP will be subject to 72 COLREGS.

14.1.2.1 33 CFR Subchapter D International Navigation Rules (33 CFR §§ 80-82)

This subchapter supplements 72 COLREGS and establishes and identifies the lines of demarcation ('COLREGS Demarcation Lines') delineating those waters upon which mariners shall comply with the 72 COLREGS definition.

14.1.3 Safety & Security

Various laws and regulations pertaining to safety and security are listed below:

<u>Safety and Health</u>

- IMO Convention on the Safety of Life at Seas (SOLAS, 2011)
- IMO/ILO Guideline for Seafarer's Hours of Work and Rest
- All applicable PHMSA regulations
- 33 CFR, Subchapter NN, Deepwater Ports, Subpart G Workplace Safety & Health
- OSHA regulations in 29 CFR Part 1910 Occupational Health and Safety Standards, as applicable
- OSHA regulations in 29 CFR Part 1917 Marine Terminals, as applicable

<u>Public Safety</u>

- Emergency Planning and Community Right-to-Know Act, 42 U.S.C. §§ 11001–11050, et seq.,
- Protection of Children from Environmental Health and Safety Risks, E.O. 13045, 62 FR 19885,
- Safe Drinking Water Act (SDWA), 42 U.S.C. §§ 300f et seq.
- Community Environmental Response Facilitation Act (CERFA), 42 U.S.C. §§ 9620, et seq.et seq.,
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), also commonly referred to as Superfund, Pub. L. 96–510, 26 U.S.C. §§ 4611, et seq.et seq., and
- Resource Conservation and Recovery Act of 1976 (RCRA), Pub. L. 94–580, 42 U.S.C. §§ 6901, et seq.et seq. Pub. L. 93–523, 42, U.S.C. §§ 201, et seq.et seq.

Maritime Security

- 33 CFR, Subchapter H, Maritime Security, Part 105 Maritime Security: Facilities
- Maritime Transportation Security Act, Pub. L. 107-295, 46 U.S.C. Chapter 701IMO International Ship and Port Facility Security Code (ISPS)

All regulatory requirements for safety, security, and oil spill response plans will be developed and submitted for review and approval to the USCG and/or the Bureau of Safety & Environmental Enforcement (BSEE), prior to commencing operations at the DWP, as applicable.

14.1.4 Industry Guidelines and Best Practices

In the next phase of the Project, a full design basis will be developed with all guidelines the Project intends to use in addition to regulatory requirements for safety and security. As a minimum, the Project intends to utilize several OCIMF guidelines to develop a Project specific Safety Plan and Security Plan, as well as final Operations Manual for the DWP. A preliminary list of engineering standards is provided in Volume I of this DWPL application.

The Oil Companies International Marine Forum is a voluntary association of oil companies with an interest in the shipment and terminal of crude oil, oil products, petrochemicals and gas. Phillips 66 Company, which indirectly wholly-owns the Applicant, is an active member of OCIMF. OCIMF's mission is to be the foremost authority on the safe and environmentally responsible operation of oil tankers, terminals and offshore support vessels, promoting continuous improvement in standards of design and operation. They have published many guidelines, and the following list will be used in developing procedures for the Project, at a minimum:

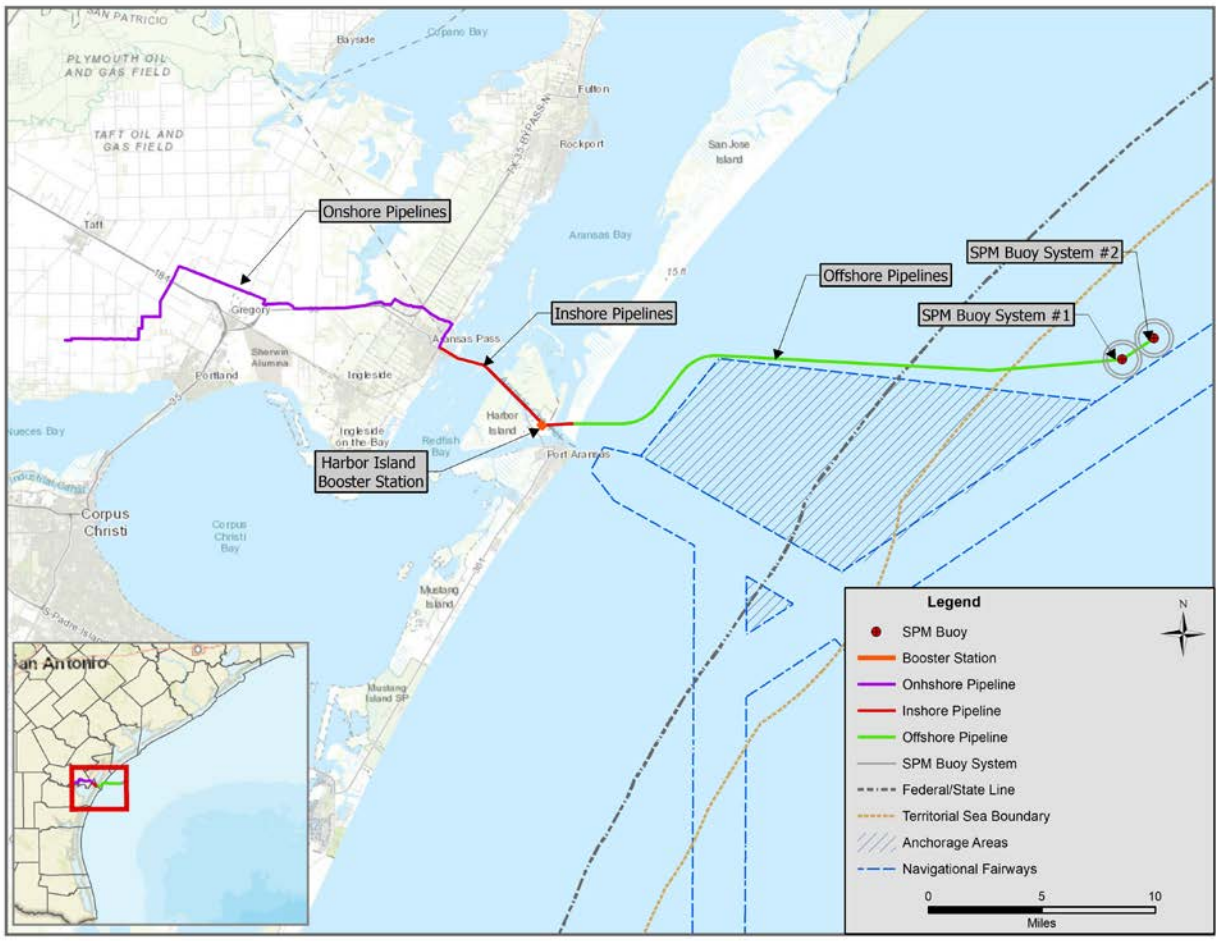
- OCIMF International Safety Guide for Oil Tankers and Terminals, 5th Edition (ISGOTT)
- OCIMF Guidance for Oil Terminal Operators on the IMO ISPS Code (December 2003)
- OCIMF Martine Terminal and Operator Competence Guide (MTOCT)
- OCIMF Marine Terminal Management and Self-Assessment (MTMSA)

14.2 Proposed Project

14.2.1 Proposed Project Area

For the purposes of this DWPL application, the Proposed Project is described in three distinguishable segments by locality including “offshore”, “inshore”, and “onshore”.

Figure 14-1: Proposed Project Area



The Proposed Project Onshore Components are defined as those components landward side of the western Redfish Bay MHT line, located in San Patricio and Aransas Counties, Texas. Onshore Project Components include approximately 22.20 miles of two (2) new 30-inch-diameter crude oil pipelines extending from the landward side of the MHT line of Redfish Bay to a planned multi-use terminal facility located south of Taft in San Patricio County, Texas.

Inshore components associated with the Proposed Project are defined as those components located between the western Redfish Bay MHT line and the MHT line located at the interface of San Jose Island and the Gulf of Mexico (GOM). Inshore Project components includes approximately 7.15 miles of two (2) new 30-inch-diameter crude oil pipelines, and an approximately 19-acre booster station located on Harbor Island. The proposed Harbor Island Booster Station would also consist of two (2) 181,000 bbl crude oil storage tanks and two (2) 181,000 bbl water storage tanks. The purpose of these tanks is to allow for the clearing of the pipeline infrastructure extending from the Harbor Island Booster Station to the DWP in the situation of an emergency or maintenance operations.

Offshore components associated with the Proposed Project are located seaward of the mean high tide (MHT) line located at the interface of San Jose Island and the GOM. The Offshore Project components include approximately 27.13 miles of two (2) new 30-inch-diameter crude oil pipelines extending to two (2) SPM buoy systems.

The deepwater port (DWP) consists of two (2) single point mooring (SPM) buoy systems, moored offshore in the GOM, outside of U.S. territorial seas boundary. The SPM buoy systems are for mooring and loading crude oil in tankers berthed at the DWP. The DWP expects to have a maximum of 8 port calls per month per buoy. The SPM buoy systems each consist of a pipeline end manifold (PLEM), catenary anchor leg mooring (CALM) system, two (2) mooring hawsers, two (2) 24" sub-marine hoses, and two (2) floating hoses for the transfer of crude oil from the SPM buoy system to moored tankers.

The proposed SPM Buoy System 1 will be installed at Latitude 27.889361 and Longitude -96.651156 in approximately 88.5 ft. of water in Bureau of Ocean Energy Management (BOEM) block number 698, approximately 15.0 nautical miles (17.26 statute miles) off the coast of San Jose Island in San Patricio County, Texas. The proposed SPM Buoy System 2 will be installed at Latitude 27.902577 and Longitude -96.628119 in approximately 89.5 ft. of water in BOEM block number 699, approximately 1.7 miles northeast of SPM Buoy System 1.

The Project is proposing an 1100 m radius Safety Zone around each of the SPM buoys that will restrict access of any vessel type from entering without prior arrangements with the DWP. In addition, the Project is proposing a No Anchoring Area (NAA) and Area to be Avoided (ATBA) at an additional 250 m beyond the Safety Zones (1350 m radius total) around each buoy.

14.2.2 Proposed Project Area Existing Conditions

Shipping and navigation resources within the vicinity of the Proposed Project include fairways, anchorages areas, dredged navigation channels, intracoastal waterways, and ports. Figure 14-2 identifies the Project in relation to these shipping and navigation resources.

14.2.2.1 Navigation

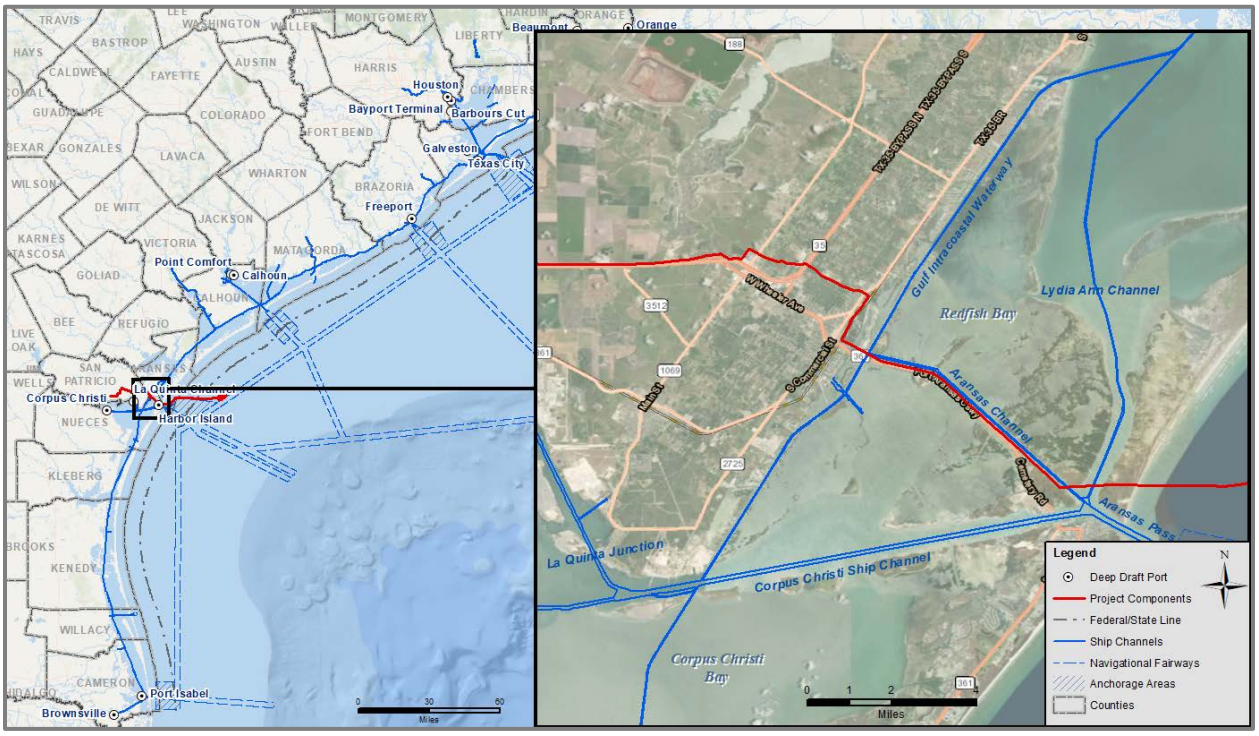
14.2.2.1.1 NEARBY PORTS

Port Aransas is located just to the south of Aransas Pass Channel. It is approximately 22 nautical miles to the west of the SPM Buoy No. 1. The port at Ingleside, Texas is the next closest, about 29 nautical miles and is inside Corpus Christi Bay. The Port of Corpus Christi (POCC) is the largest port near the Proposed Project, located approximately 39 miles to the West inside Corpus Christi Bay.

The POCC is the fifth largest port in the U.S., providing access to the GOM, inland waterways, and offering connections to three railroad systems (POCC 2018). About 14 percent of the vessel calls to Texas ports in 2015 were to the POCC. Vessel calls to this port were also comprised mostly of tankers (67 percent) and included dry bulk (16 percent), gas (9 percent), and cargo (8 percent) (POCC 2019). The majority of commercial traffic in route to the POCC enters Aransas Pass from the Gulf Safety Fairway from the southeast. The POCC does not regularly receive cruise ships engaged in multi-day trips, thus, cruise ships do not typically use the shipping safety fairways near the Project.

The Ports of Galveston and Houston on Galveston Bay are the closest cruise ship departure ports to the proposed Project. Between 2004 and 2007, about 1,050 cruise ships departed from the Ports of Galveston and Houston (Maritime Administration 2018). However, in subsequent years (2008 through 2012), departures in Texas have occurred exclusively from the Port of Galveston and during this time the number of departures has continued to decline. These ports are located over 180 miles (290 kilometers) north of the proposed Project (see Figure 14-2). (BOEM 2018a, 2018b; A Barrel Full 2018; Maritime Administration 2018)

Figure 14-2: Navigation Fairways, Ship Channels, and Existing Ports



14.2.2.1.2 INSHORE SHIPPING CHANNELS

See Figure 14-2 above for a depiction of the following inshore channels.

THE GULF INTRACOASTAL WATERWAY

The Gulf Intracoastal Waterway (GIWW) is a 1,300-mile Federal, shallow-draft, man-made navigation channel that runs along the GOM coastline from Brownsville, Texas, to St. Marks, Florida. The GIWW links Texas ports with the rest of the country and is part of the larger Intracoastal Waterway that includes a stretch on the Atlantic seaboard, from Key West, Florida to Boston, Massachusetts. (TXDOT 2019, US Army Corps of Engineers [USACE] 2019)

The 423-mile-long Texas stretch of the GIWW handles more than 50 percent of the GIWW's traffic and up to 90 million tons of freight annually. The GIWW allows ports on the Texas Gulf Coast to be key hubs for shipping throughout North America and to be at the center of the state's multimodal transportation plan that combines trucking, rail and marine shipping (TXDOT 2019, USACE 2019). The proposed Project crosses the GIWW directly to the east of the Harbor Island booster station. Horizontal directional drill (HDD) pipeline installation techniques will be used to install pipelines under the Aransas Pass and Lydia Ann Channels. See NOAA Nautical Chart 11314 to view the GIWW effected by the channel crossings in the Proposed Project Area.

ARANSAS PASS CHANNEL

To transit into Aransas Bay, Redfish Bay, Matagorda Bay, Laguna Madre, or Corpus Christi Bay and the intracoastal waterways, marine traffic with deeper than 12 ft. draft will most likely enter the intracoastal waterway and inshore channels through Aransas Pass. The entry to Aransas Pass is marked by a radio transmitting buoy. Large commercial ships can pick up pilots at this buoy and enter the channel. To the northeast of the buoy is the Fairway Anchorage. Once a vessel is through Aransas Pass it arrives at the Humble Basin and can transit north into Lydia Ann channel, to the northwest into Aransas channel or to the southwest into Humble Basin to La Quinta Junction toward Corpus Christi ship channel

ARANSAS CHANNEL

Aransas channel is for local vessel traffic and has a controlled depth of 9 ft. The Project pipelines are routed in parallel with the Aransas Channel starting the inshore route at Aransas Pass, Texas, crossing Redfish Bay, transiting across Harbor Island and the Humble Basin, and ending on San Jose Island before starting the offshore route to the SBMs.

LYDIA ANN CHANNEL

Lydia Ann Channel is for local vessel traffic and runs north between San Jose Island and Harbor Island.

HUMBLE BASIN TO LA QUINTA JUNCTION

Humble Basin is just inshore of Aransas Pass. A tanker or commercial ship entering Aransas Pass will continue through Humble Basin, making a hard left, heading toward Ingleside Bay. Just after Ingleside, the La Quinta channel junction turns north. Continuing straight or to the west, is the Corpus Christi Ship Channel (CCSC).

THE CORPUS CHRISTI SHIP CHANNEL

The Corpus Christi Ship Channel consists of a 45-foot ft. deep (mean lower low water [MLLW]) channel that extends from the Gulf of Mexico, through the jetties in Port Aransas, Texas and across the Corpus Christi Bay. The CCSC has several junctions that connect the Main Channel to other areas; these channels include Rincon Channel, La Quinta Channel, Aransas Channel and the GIWW. (Port Corpus Christi 2018)

14.2.2.1.3 OFFSHORE NAVIGATION FAIRWAYS & ANCHORAGE AREAS

A fairway is defined in federal law as a lane or navigation corridor in which no artificial island or fixed structure, whether temporary or permanent, will be permitted (Definition of Shipping Safety Fairway, 33 CFR Part 166.105). If required, fairways are dredged for specific vessel drafts to transit through straights or to channels into ports, such as the channel into Aransas Pass.

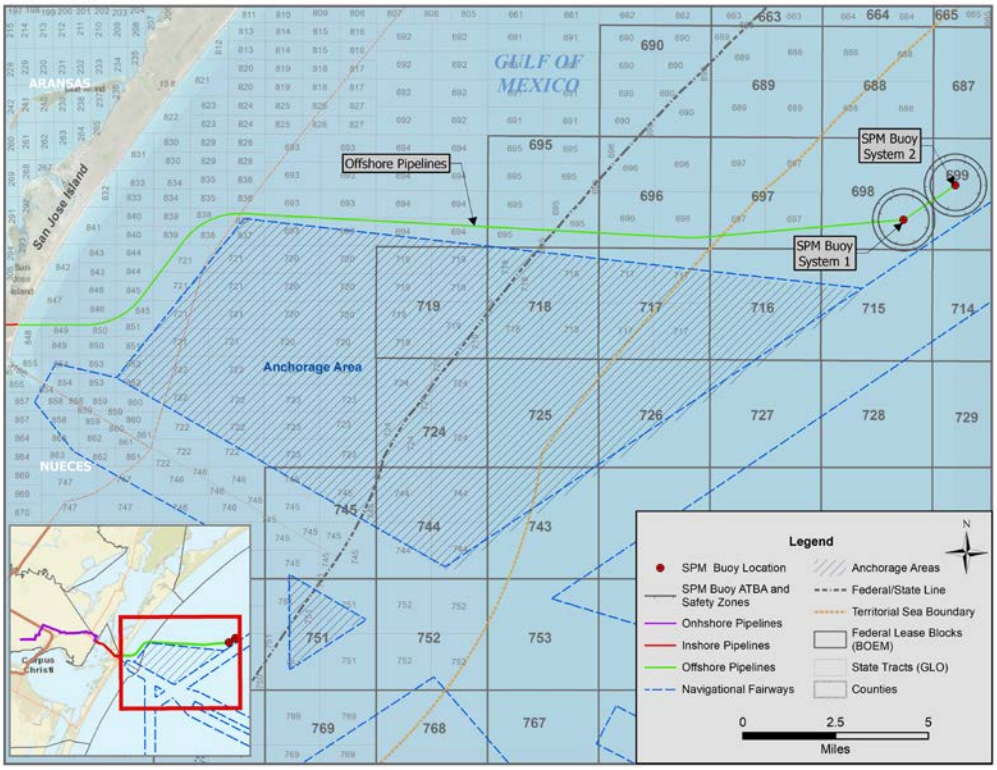
Within the GOM there is an extensive network of fairways radiating off the shoreline and crossing the GOM. Within the vicinity of the Project, the nearest fairway is adjacent to the Proposed Project, about 0.8 nautical miles from the SPM buoys. This fairway runs from Aransas Pass to Matagorda Bay to the northeast of the Proposed Project. This fairway, as discussed below in the section on traffic density, is traveled frequently by local vessels, such as fishing and supply vessels, and some commercial traffic.

The main international, commercial fairway into Aransas Pass is from the southern fairway, about 11.5 nautical miles to the southwest of Buoy No. 1. This fairway is divided for inbound and outgoing traffic and connects the east to the main fairway for international ships traveling in to or out of the Gulf of Mexico. Then next nearest fairway is a north-south connection between Aransas Pass and Brownsville, Texas to the South.

Anchorage areas are locations where a vessel can anchor while waiting to enter port or to be serviced by a barge or supply vessel. A Fairway Anchorage is defined in federal law as an anchorage area contiguous to and associated with a fairway, in which fixed structures may be permitted within certain spacing limitations, as described in 33 CFR Part 166 Subpart B (Definition of Fairway Anchorage, 33 C.F.R. Part 166.105).

There is an unmanaged Fairway Anchorage, located approximately 2 nautical miles west of the DWP. The anchorage is east of the approach into Aransas Pass and used mainly for vessels to await pilots and entry into Corpus Christi. This anchorage is being proposed as a location for tankers calling at the DWP to anchor, if waiting is required. No additional anchorages are being proposed.

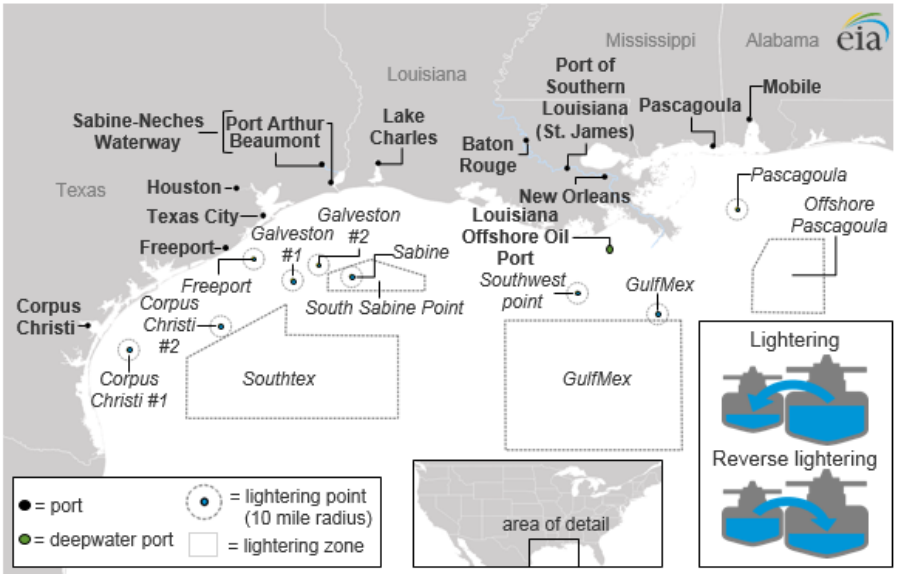
Figure 14-3: Proposed Project Deepwater Port Details



LIGHTERING ZONES

The locations of designated lightering rendezvous locations in the GOM are shown in the figure below published by the U.S. Energy Information Administration (EIA).

Figure 14-4: Petroleum Ports and Lightering Areas



Source: EIA. 2018

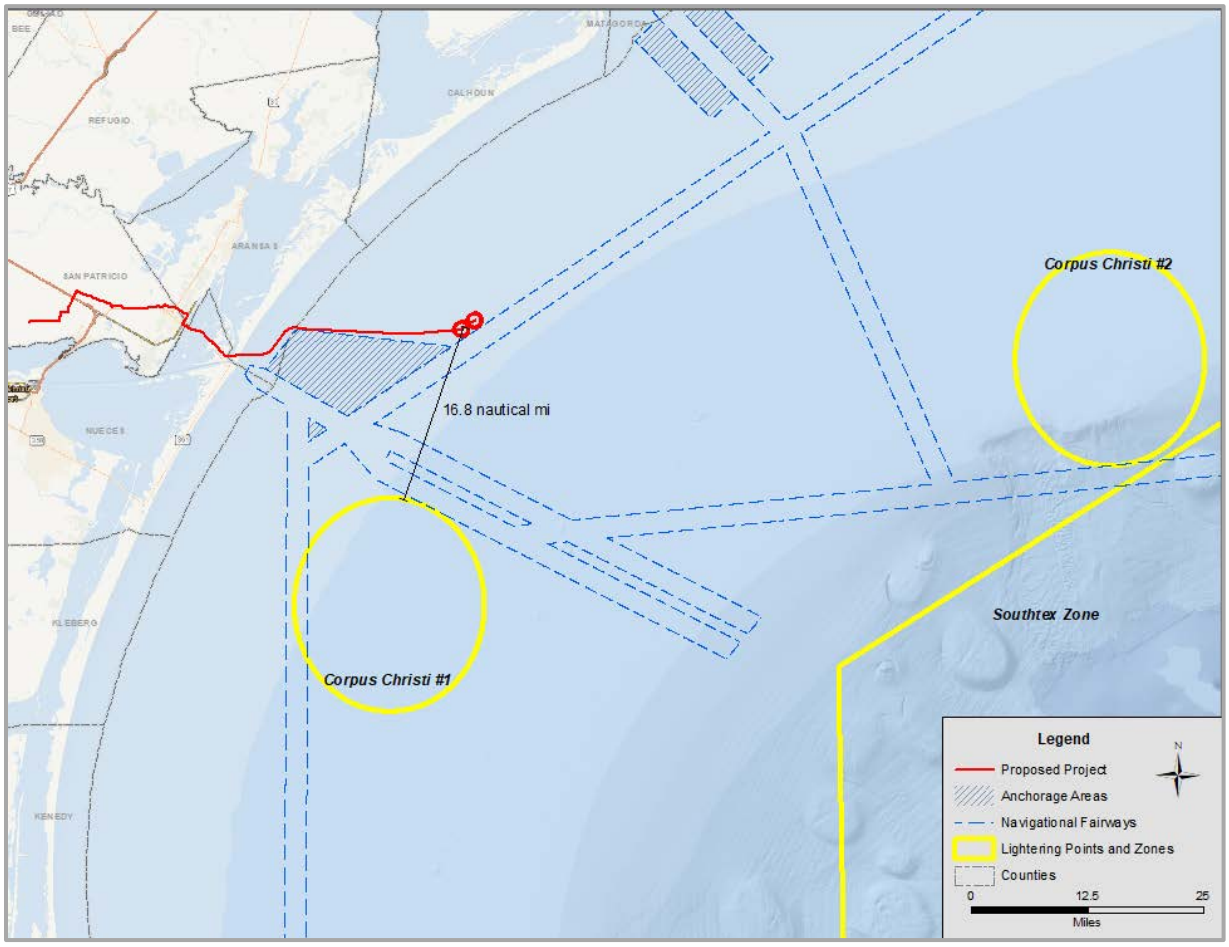
Each VLCC is designed to carry approximately 2 million barrels of crude oil. Because of their large size, VLCCs require ports with waterways of sufficient width and depth for safe navigation. All onshore U.S. ports in the Gulf Coast that actively trade petroleum are located in inland harbors and are connected to the open ocean through shipping channels or navigable rivers. Although these channels and rivers are regularly dredged to maintain depth and enable safe navigation for most ships, they are not deep enough for deep-draft vessels such as fully loaded VLCCs.

To circumvent depth restrictions, VLCCs transporting crude oil to or from the U.S. Gulf Coast have typically used partial loadings and ship-to-ship transfers. The ship-to-ship transfer process known as lightering refers to a larger vessel partially unloading onto a smaller vessel. Reverse lightering occurs when smaller vessels load onto a larger vessel. Four AFRAMAX-sized vessels or two SUEZMAX-sized vessels are required to carry the same amount of crude oil as a single VLCC.

The inability to fully load larger and more cost-effective vessels has pricing implications for U.S. crude oil exports. Using a number of smaller ships requires a wider price spread between U.S. crude oil and international crude oil prices to compensate for the lower economies of scale and costs associated with reverse lightering and partial loadings (EIA 2018).

The location of the closest lightering areas to the project location is depicted in the figure below.

Figure 14-5: Proposed Project Distance to Lightering Areas



14.2.2.1.4 VESSEL TRAFFIC

VESSEL TRAFFIC MANAGEMENT

The purpose of a Vessel Traffic Service (VTS) is to provide active monitoring and navigational advice for vessels in particularly confined and busy waterways. There are two main types of VTS, surveilled and non-surveilled. Surveilled systems consist of one or more land-based sensors (i.e. radar, Automatic Identification System (AIS) and closed-circuit television sites), which output their signals to a central location where operators monitor and manage vessel traffic movement. Non-surveilled systems consist of one or more reporting points at which ships are required to report their identity, course, speed, and other data to the monitoring authority (USCG 2018).

The DWP location is outside the nearest USCG VTS area. The nearest VTS location managed by the USCG is the Port of Galveston-Houston. The USCG does regulate the communications in and out of the DWP under 33 CFR. Radio communications offshore are regulated under the Federal Communications Commission.

TRAFFIC DENSITY (AIS & VMS)

Traffic near the DWP was evaluated using data and mapping from marinetraffic.com and the Marine Cadastre National Viewer (BOEM/NOAA 2019). The data from Vessel Information System (VIS) and Automatic Identification System (AIS) is shown with a color gradient representing routes per year. See the below figures to view most traveled routes by different vessel type.

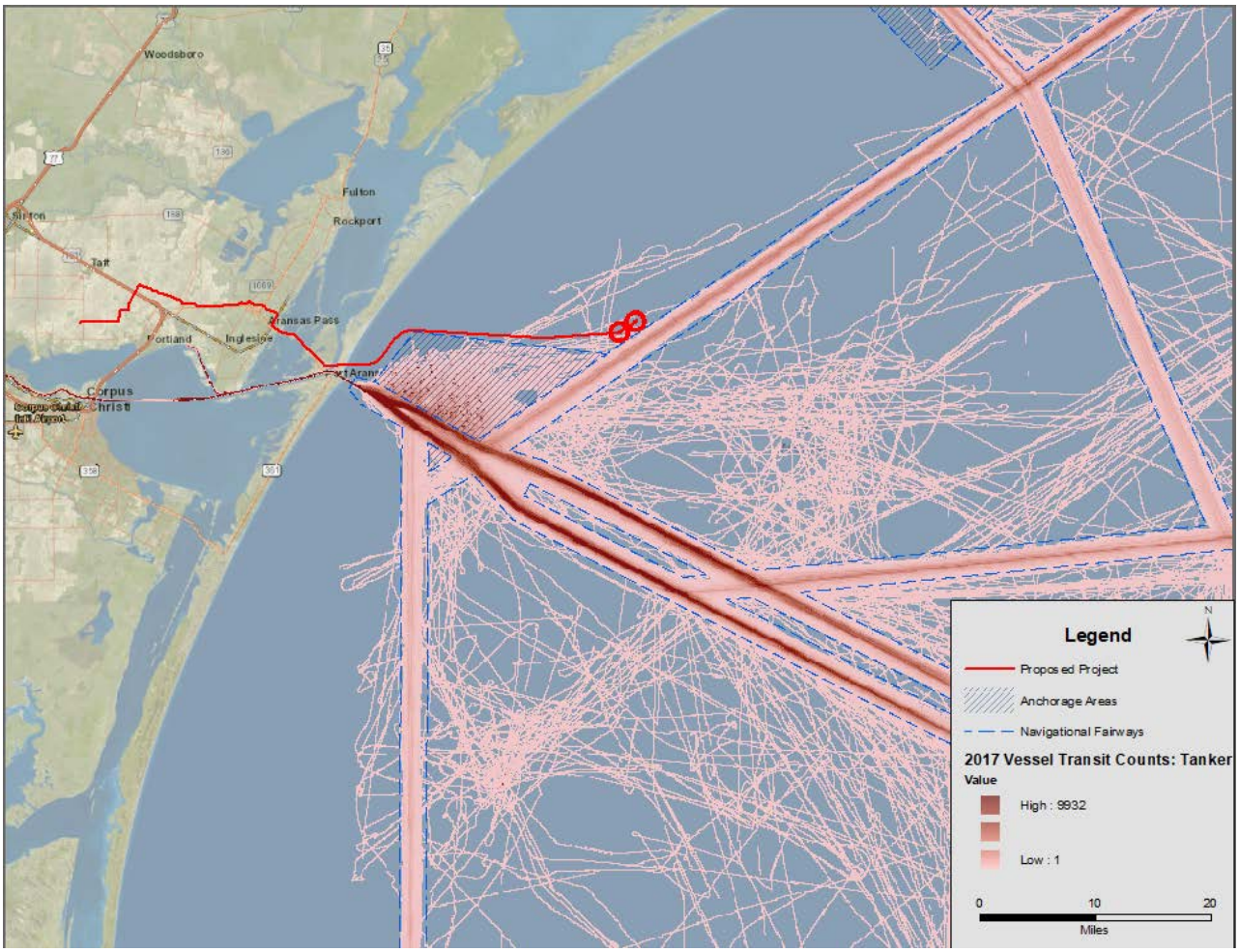


Figure 14-6: 2017 Tanker Traffic

As discussed above, the tankers and commercial traffic are utilizing the parallel sea, or gulf, safety fairway traveling northwest/southeast into and out of Aransas Pass. This is likely where the majority of VLCCs will be approaching having entered the GOM from an international route. The website has filters to view density by tanker type, such as Handysize, Handymax/Panamax/MR/LR1, and Aframax – LR2.

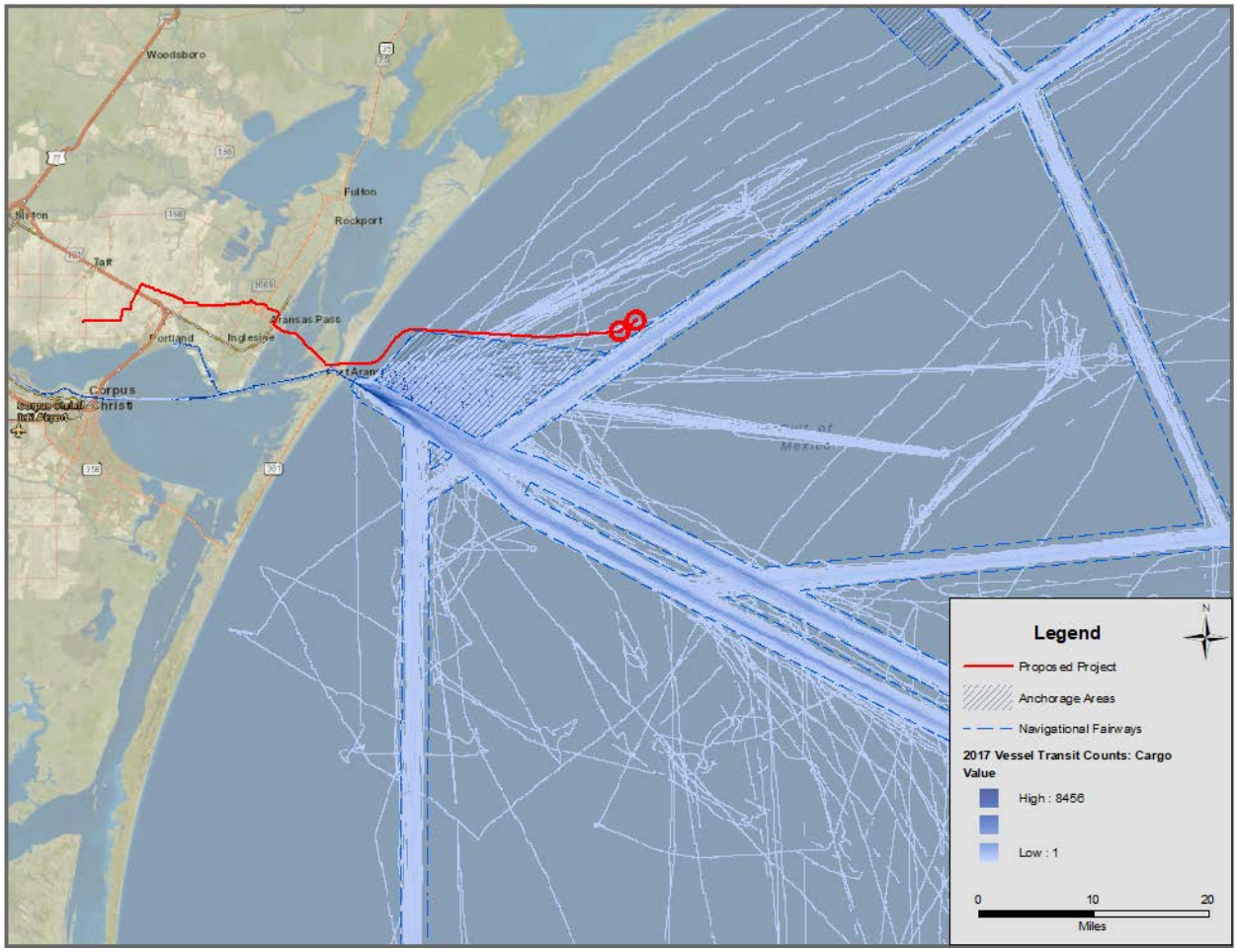


Figure 14-7: 2017 Cargo Traffic

Cargo vessel traffic is less traveled in the fairway into and out of Aransas Pass as compared with tanker but still a substantial number utilizing the main sea fairway.

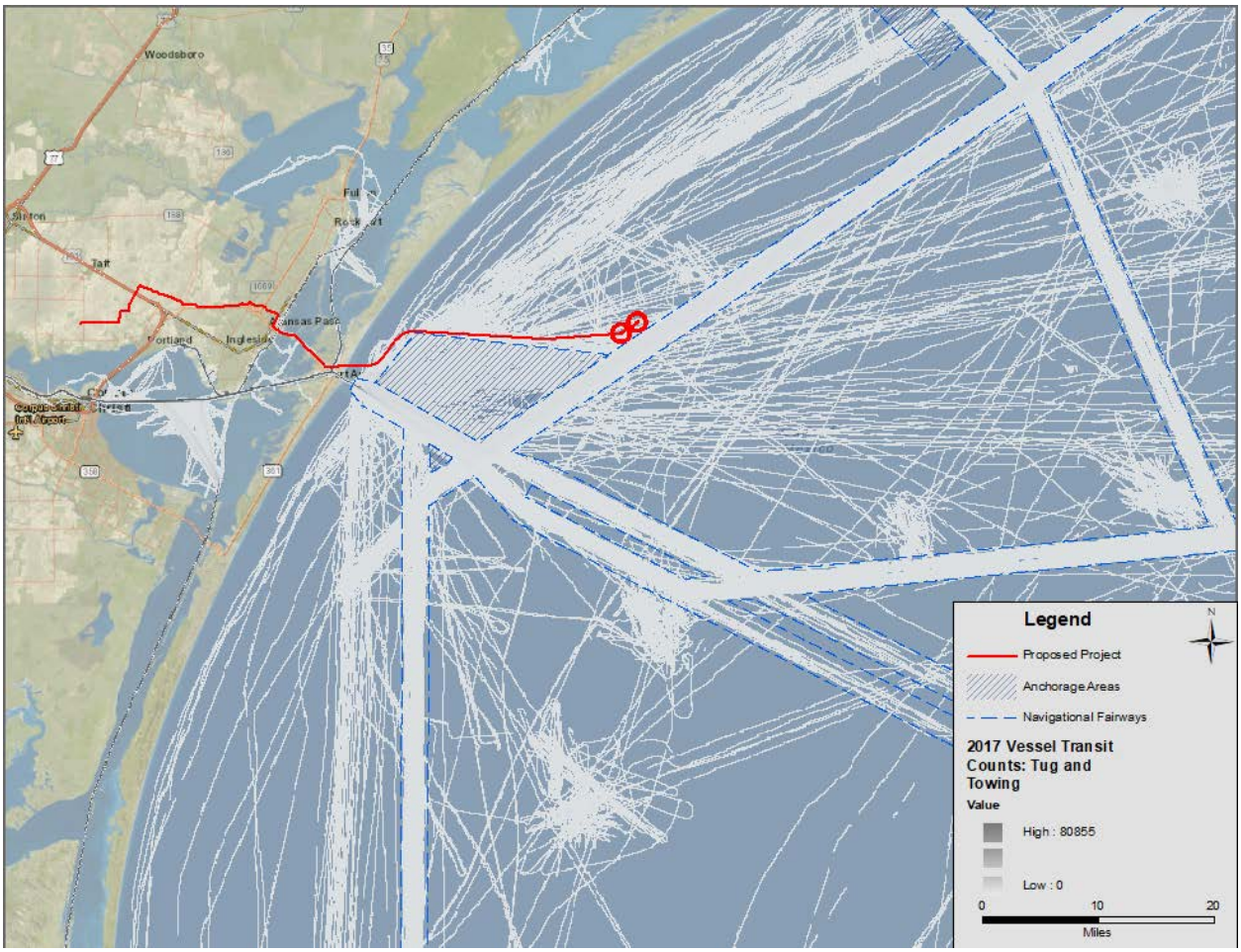


Figure 14-8: 2017 Tug and Tow Traffic

Tug and Tow vessel traffic appears to be similar in nature to cargo and tanker, as would be expected with the need for tug and tow vessels to aid in the navigation of vessels into Aransas Pass, and during lightering operations. Passenger and containership traffic in 2017 were almost negligible and the figures were not included in the report.

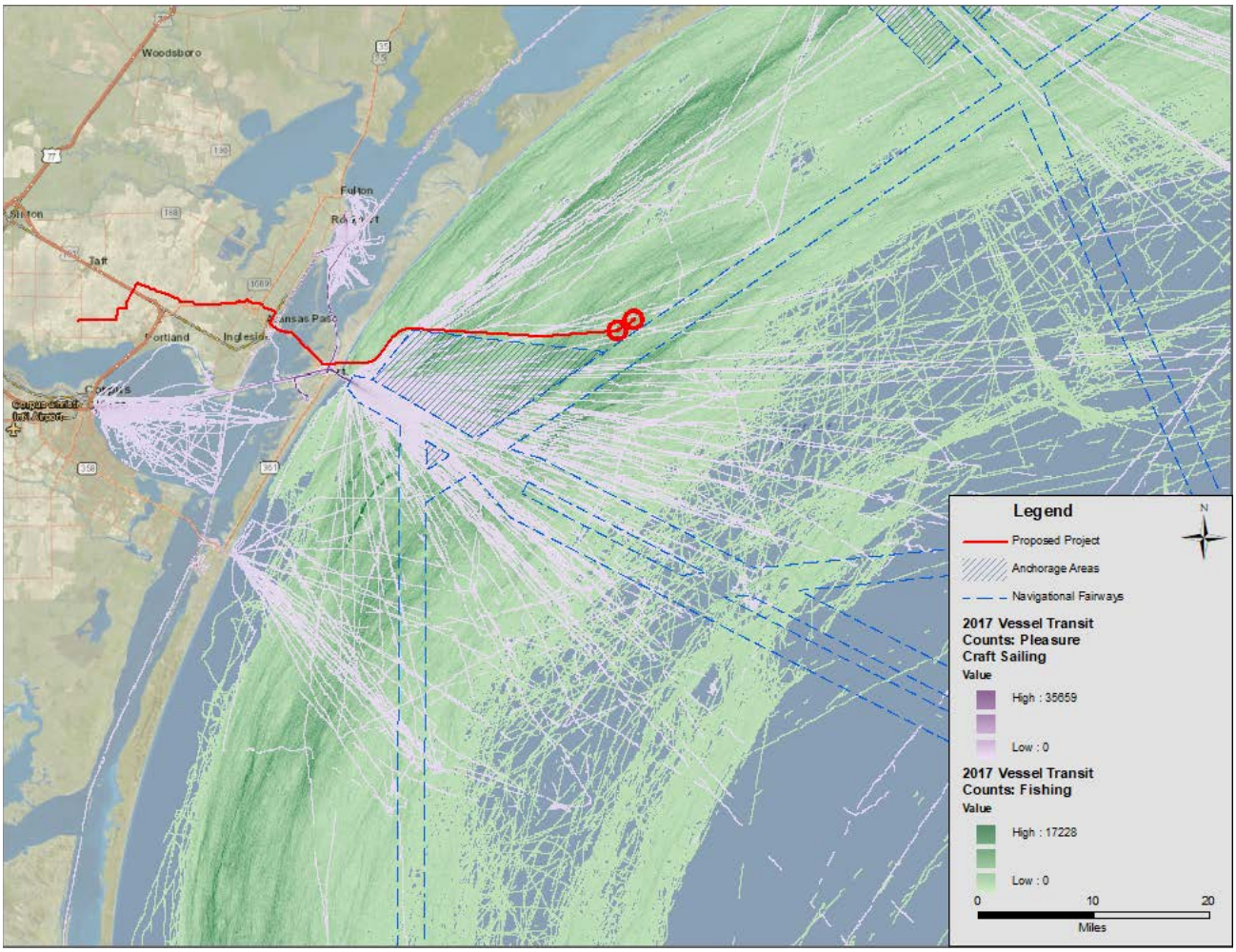


Figure 14-9: 2017 Pleasure Craft and Fishing Vessel Traffic

The above figure illustrates the traffic density from pleasure craft (recreational) and fishing vessels in 2017. In this figure it is apparent that the areas in and around the Project are heavily traveled in a very sporadic way. The pleasure craft and fishing vessels do not utilize the navigational fairways. Because these smaller vessels are harder to see, have sporadic routing and do not always carry VIS or AIS, even if required, they pose the largest risk to the DWP operations. Fishing vessel and recreational vessel usage in and around the project area is included in Section 12.

USCG CASUALTY DATA

The Marine Information for Safety and Law Enforcement (MISLE) Marine Casualty and Pollution Database was downloaded from the USCG website (USCG 2015). The data set is dated July 6, 2015 and contains data from January 2002 - July 2015.

The Marine Casualty and Pollution Database contain data related to marine casualty investigations reportable under 46 C.F.R. 4.03 and pollution investigations reportable under 33 C.F.R. 153.203. The data reflect information collected by U.S. Coast Guard personnel concerning vessel and waterfront facility accidents and marine pollution incidents throughout the United States and its territories. All activities in the database are closed investigations.

File Names	Number of Records	Contents
MisleActivity.txt	106,642	Lists Activity Identifiers (ID)– case number that links all mishaps to a single casualty event (i.e. a collision may have an injury, property damage, and cause pollution)
MisleFacEvents.txt	18,116	Facility Marine Casualty Events
MisleVslEvents.txt	132,717	Vessel Marine Casualty Events
MisleOtherEvents.txt	6,141	Other Marine Casualty Events
MisleInjury.txt	13,794	Personnel Injury Events
MisleFacPoll.txt	13,894	Facility Pollution Events
MisleVslPoll.txt	23,179	Vessel Pollution Events
MisleOtherPoll.txt	11,219	Other Pollution Sources Events
MisleVessel.txt	1,346,643	Vessel Data
MisleFacility.txt	62,671	Facility Data

The records in the databases are linked by activity ID. For example, an event between two vessels could result in an injury, a loss of containment, and a failure of equipment. This would show up as two records under MisleFacEvents, and one for each type of casualty under MisleVslPoll, MisleInjury, and MisleOtherEvents.

The SPM buoys have the following coordinates at the proposed project location:

Table 14-1: Proposed Project SPM Buoy Locations

	Buoy No. 1	Buoy No. 2
Latitude	N27° 53’ 21.70 27.8891	N27° 54’ 09.28 27.9025
Longitude	W96° 39’ 04.16 -96.6511	W96° 37’ 41.23 -96.6281

The seven (7) files above that include the casualty, pollution and injury data were each filtered by latitude and longitude. The data was filtered to eliminate entries outside 15nm around the buoys in 4 directions. The filtering criteria is as follows:

Table 14-2: Filter Criteria for MISLE data

	Greater than or equal to	Less than or equal to
Latitude	27.6389	28.1523
Longitude	-96.9329	-96.3458

Summary of Results

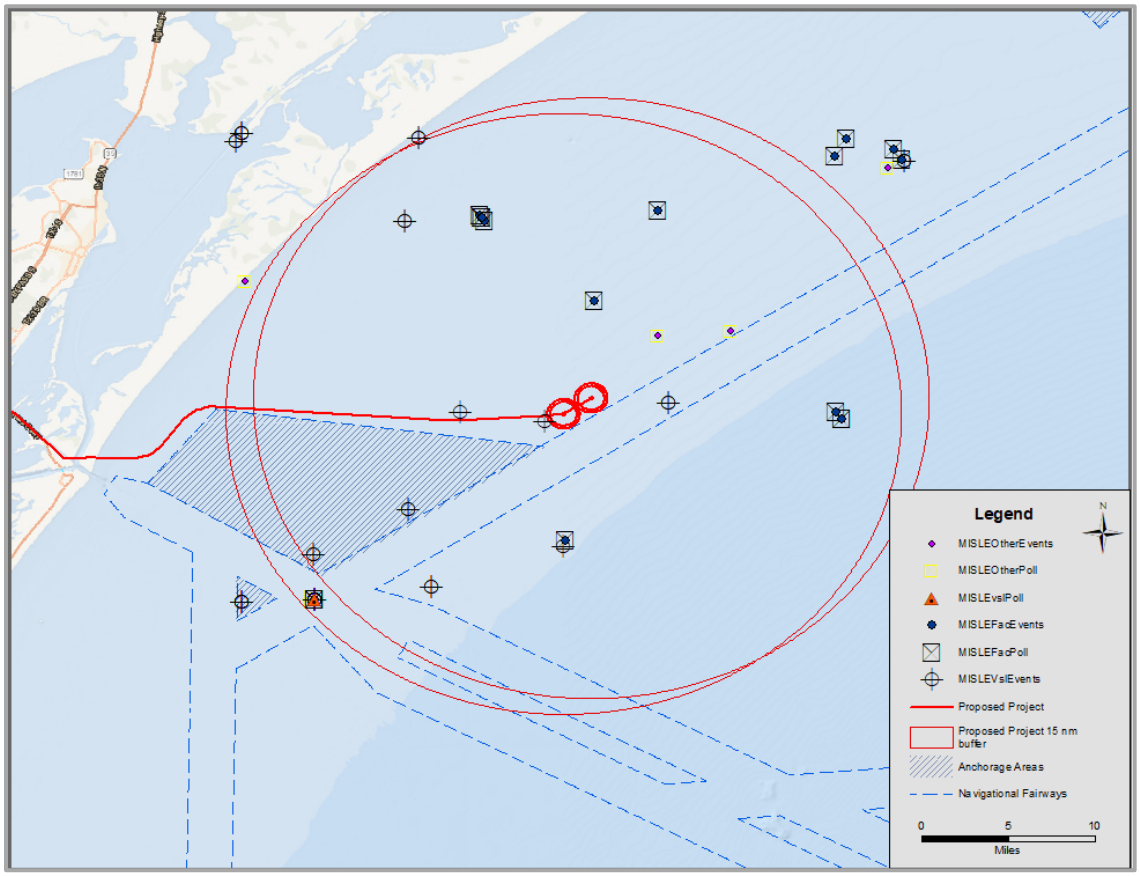
After the 13 years of data was filtered based on location the following number of records remained for the 7 files:

Table 14-3: USCG Casualty database records

File Names	Number of Records	Number of Unique events
MisleFacEvents.txt	18	18
MisleVslEvents.txt	43	22
MisleOtherEvents.txt	4	4
MisleInjury.txt	0	0
MisleFacPoll.txt	18	18
MisleVslPoll.txt	2	2
MisleOtherPoll.txt	4	4

There were 0 injuries, 18 pollution events, and 43 vessel casualty events over the period from January 2002 - July 2015. As discussed above, this does not include any cases that are still open. Some of these records are linked to the same case id and are part of the same event. For example, MisleVslEvents has 43 total entries that meet the criteria, but only 22 that have a unique activity ID. As explained above, this means that a collision between two vessels that causes loss of oil containment in one vessel shows up as 3 vessel incidents.

Figure 14-10: USCG MISLE Casualty Data for Proposed Project Area



The total discharged amount of oil during the database time period for closed cases in the filtered area around the Proposed Project location is 529.9 gallons.

The 43 vessel events were analyzed for event type and the results are shown in the below table. These events are the result of casualties experienced by 26 different vessels. They are only closed cases, as described above.

Table 14-4: MISLE Database Number of Vessel Event types

Material Failure (Vessels)	13
Vessel maneuverability	8
Allision	5
Emergency response	4
Damage to the Environment	2
Collision	2
Flooding	2
Fouling	2
Loss of Electrical Power	1
Fire	1
Abandonment	1
Set Adrift	1
Damage to Cargo	1
Grounding	0
Sinking	0
Loss of Stability	0
Capsize	0
Evasive Maneuvers	0
Explosion	0
Ferry	0
TOTAL	**43**

14.2.2.2 Safety and Security

14.2.2.2.1 SAFETY OF CRUDE OIL EXPORT

PHYSICAL AND CHEMICAL PROPERTIES

Crude oil is the liquid form of petroleum which is a mixture of hydrocarbons and different compounds. Hydrocarbons account for up to 98 percent of the total composition of crude oils. The chemical composition of crude oil can vary significantly based on the producing area. Crude oil is refined and processed to remove impurities like sulfur and to develop products that are useful to the consumer and industry, such as gasoline and diesel fuel. Light crude oil, or condensate, is light or straw, green, yellow to black, clear to opaque in color with a mild hydrocarbon or rotten egg odor. The average API gravity for the crude oil is 46.2 degrees.

Crude oils and refined petroleum products consist largely of hydrocarbons, which are chemicals composed solely of hydrogen and carbon in various molecular arrangements. Crude oils contain hundreds of different hydrocarbons and other organic and inorganic substances including atoms of sulfur, nitrogen, and oxygen, as well as metals such as iron, vanadium, nickel, and chromium. All crudes contain lighter fractions similar to gasoline, as well as heavier tar

or wax constituents, and may vary in consistency from a light volatile fluid to a semi-solid. Crude oils and semi-refined products, such as diesel and bunkering oils, may also contain cancer-causing polycyclic aromatic hydrocarbons and other toxic substances.

OFFSHORE PIPELINE SAFETY

Fabrication, installation, testing and commissioning procedures and details are described in Appendix A, Construction, Operation, and Decommissioning Procedures. All pipelines are to be designed, operated, and maintained in accordance with all current and applicable standards and regulations.

Additionally, design and operation strategies taken into consideration to decrease the safety risks associated with the offshore pipelines include burying pipelines a minimum of 3 ft below the seabed and utilizing HDD pipeline sections to reduce interference with navigation, other pipelines, or sensitive areas that could lead to increased safety hazards.

The Proposed Project offshore pipeline route was selected based on the Alternatives Analysis (Section 2) and further refined during preliminary engineering, following extensive geophysical, geological, archeological, and hazard surveys. Such surveys and studies were conducted while designing the pipeline to ensure the offshore pipeline avoids all potential hazards and is designed to be as stable and safe as practicable.

An anchor or net snagging the pipeline risers or interconnection junctions could result in damage to the Project's infrastructure or the third-party vessel. The Safety Zone, ATBA, NAA, and Port Operations Manual vessel traffic monitoring and warning procedures would minimize the risk of such incidents. In addition, the Applicant proposes to bury all offshore pipeline segments a minimum of 3 feet below the sea bottom to further minimize the risk of third-party damage.

Damage from outside forces poses the greatest threat to pipeline safety. Subsea pipelines are to be constructed and operated with specifications that minimize the potential for damage from these outside forces. A valve station would be located at Harbor Island Booster Station. The proposed Harbor Island Booster Station would consist of shut off valves to allow for the isolation of offshore and onshore sections of the proposed pipeline infrastructure during emergencies such as pipeline break or leak, and routine maintenance and inspection operations. The Harbor Island Booster Station would house two 30-inch-diameter full bore 300 series motor operated valves designed to close upon sudden rise or fall of pipeline pressure. In the situation of a pressure drop or increase within the pipelines, communications equipment would be utilized for the emergency shut down of pumps located at the booster station.

THREATS FROM OIL SPILLS

The main threat from a significant oil spill into the sea offshore is on marine life and on the coastal environment, if the spill were to make landfall. Threats and the overall impact of oil in water are dependent on the amount of oil spilled, the response time for clean-up, and the environmental conditions during the response efforts. Minor oil spills on vessels produce a risk of ignition that could lead to a fire but would not likely lead to impact on the marine environment. Small volume spills have little to no effect on marine life or the coastal environment as the hydrocarbons are dispersed or broken down at a rate faster than clean-up action can occur.

A trajectory model was completed for this Project, to evaluate the coastal impact (how much oil makes landfall), in the event of a worst-case discharge from all the offshore components. This model was used to create a tactical response plan that ensures the equipment and resources are available, if a large-scale spill would occur, although extremely unlikely. Mitigation measures in design of the plan are also briefly discussed. The trajectory model and tactical response plan are included within Volume I of this DWPL application.

All oil in the water must be recorded and reported. Tankers, under IMO regulations, are required to keep an Oil Record Book recording any oily water quantities that are discharged overboard. There are audit requirements for the book to hold operators accountable. Any oil greater than 15 ppm must remain onboard and cannot be discharged

overboard. Any amount of oil over 15ppm in water or any oil that goes into the water must be reported to the appropriate authorities. All oil spills must be reported to the National Response Center.

Both the DWP and the tankers will have Emergency Response Plans that follow specific steps in reporting and initiating the response to an oil spill. Tanker and DWP operators are required by law to have a contract with an Oil Spill Response Operator that owns and operates resources capable and ready to respond to a spill and mitigate the potential impacts.

All measures available will be taken to mitigate the likelihood of a spill into design and through competency and training of operations personnel.

14.2.2.2.2 DEEPWATER PORT SAFETY

DWP safety requirements are prescribed in the USCG 33 CFR Subchapter NN and International Safety Guide for Tankers and Terminals (ISGOTT). Operations at the DWP will adhere to all applicable laws, regulation, and standards. Operations of the DWP including all personal safety procedures and emergency response will be dictated in the final Operations Manual and Emergency Response Plan as well as other appropriate documents such as the Facility Security Plan. The documents will be completed and submitted to the USCG for approval prior to operation of the Proposed Project.

OCCUPATIONAL SAFETY

The Occupational Safety and Health Act (OSHA) of 1970 (29 U.S.C. §§ 651-678) was enacted to ensure, to the extent possible, safe and healthful working conditions and to preserve our human resources. The Act encourages employers and employees to reduce occupational safety and health hazards in their places of employment and stimulates the institution of new programs and the perfection of existing programs for providing safe and healthful working conditions. OSHA is responsible for developing and enforcing workplace safety and health regulations.

In addition, the USCG has issued regulations governing DWPs under 33 CFR Parts 148-150. As specified in 33 CFR Part 150, the training required by personnel manning DWP is extensive. It includes training such as water survival, emergency medical procedures, hazardous materials procedures, spill response and clean up, as well as other operational procedures.

In the next phase of the Project, an overall DWP Safety Plan will be developed detailing the DWP policies, procedures and training requirements. The DWP will utilize a Health, Safety and Environmental Management System as described in the OCIMF Marine Terminal Management and Self-Assessment. The safety management system tracks and maintains safety metrics, as well as addresses requests for corrective action of deficiencies of equipment conditions or in the safety policies and practices. The safety management system will be auditable.

MARINE SAFETY STANDARDS

Internationally trading oil tankers follow the conventions set forth by the International Maritime Organization (IMO). Safety of Life at Sea (SOLAS) is the IMO convention that prescribes requirements for safety on tankers. While calling at US ports, internationally trading tankers that operate under a foreign (non-US) flag are required to have a USCG Certificate of Compliance. These are USCG requirements under 46 CFR §153.9 foreign flag vessel endorsement application and requires a US Certificate of Inspection and all IMO required certificates.

14.2.2.2.3 VESSEL AND NAVIGATION SAFETY

VETTING STANDARDS

The Applicant will have a vetting procedure or standard that lists the minimum requirements that a vessel management company and a specific tanker must meet in order to be fit to carry cargo. Once a tanker is nominated to load at the DWP, the tanker will be vetted against this procedure and standard and must meet the minimum requirements. These requirements can include technical requirements, such as age and condition of the hull steel,

as well as requirements about owner management systems, competency and training of personnel and previous inspection history.

SPM BUOY SAFETY STANDARDS

The SPM buoy and its mooring system will be designed and built under classification by an International Association of Classification Societies (IACS) approved Classification Society as well as a USCG approved certifying entity. The SPM buoy will be unmanned. Boarding the SPM buoy will be done for maintenance and inspection purposes only with careful planning and industry standard safety precautions in place. The buoy is equipped with catwalks and handrails where access would be needed. A maintenance and inspection plan will also be reviewed by the Classification Society and the certifying entity that will prescribe inspection frequency and critical spare parts. Health and Safety requirements for the DWP are covered in 33 CFR Subchapter NN Subpart G.

TANKER DESIGN INTEGRITY

Crude oil tanker design integrity is ensured through the system of Classification. The International Association of Classification Societies sets the rules and guides for Classification. A valid classification society certificate will be a requirement for tankers contracted to load at the DWP.

The USCG Certificate of Compliance, as described above, also requires the tanker is in good standing with the vessel classifying society, has a valid Classification certificate and USCG Certificate of Inspection. Applicable provisions for a COI are provided in 46 CFR §31.05-1.

SAFETY ZONES, AREA TO BE AVOIDED AND NO-ANCHORING AREA

Safety Zones, Areas to be Avoided (ATBAs) and No-anchoring Areas (NAAs) are used to restrict or to advise against entering an area that is hazardous to other marine traffic. For this Project, a safety zone with a radius of 1100 m is proposed around the SPM buoy. This circle will include the swing radius of the tanker while berthed, plus an additional 500 m. Vessels must request entrance into the zone to approach the buoy and begin berthing procedures. The Operations Manual details the notification requirements for the tanker when approaching the DWP. The safety zone will also restrict access to any marine traffic that is not authorized to enter. It is federally enforced by the USCG and will be monitored by the DWP operators and the mooring masters. The safety zone will be added to the NOAA chart, if accepted and approved.

A security zone can also be established by the USCG when there is reason to believe or expect that a threat exists or could reasonably develop with respect to a vessel or facility. The dimensions and conditions would be predicated based upon a threat assessment. A security zone is similar to a safety zone in that it is not an absolute exclusion zone. It differs, however, in that it requires a physical on-site enforcement presence. There is no reason at present to expect that a permanent security zone will be established at the proposed DWP.

AIDS TO NAVIGATION

Aids to navigation are installed to make visible the offshore marine components by other marine traffic. The SPM buoy will be lighted and have a radar reflector installed for visibility by other vessels at night. The hoses will have winker lights installed on them to be seen at night. Navigation and navigation safety are further discussed above.

14.2.2.2.4 DEEPWATER PORT SECURITY

After the events of September 11, 2001, attention was focused on the prevention of terrorist attacks involving vessels and port facilities. This resulted in vast changes in operational procedures and new port security regulations. These changes substantially impacted the operating procedures of the USCG and owners of vessels and port facilities. The IMO also added Chapter 11-2 to the Safety of Life at Sea Convention, which includes a new International Ship and Port Security Code (ISPS). The SPM buoys will be unmanned; therefore, personnel safety offshore during normal operations will be a concern on the tanker, during the inspection of the buoy and associated equipment and on support vessels. Port Security requirements are prescribed in 33 CFR Subchapter H Maritime Security Part 105 Maritime Security: Facilities and the ISPS.

In the next phase of the Project a DWP Facility Security Plan (FSP) will be developed detailing the specific policies and procedures for the DWP in accordance with all applicable regulations. Drill and exercises must test the proficiency of facility personnel in assigned security duties at all U.S. Coast Guard Maritime Security (MARSEC) Levels and the effective implementation of the FSP. Maritime security plans and procedures at the facility will be detailed in the FSP including requirements in 33 CFR part 106 and 33 CFR 150.15 (x). The DWP will complete a Security Assessment and Develop a Facility Security Plan (FSP), in accordance with the regulations. Under the regulations in Subpart H for facilities, the DWP operator must ensure the implementation of security measures for access control, newly hired employees, restricted areas, handling cargo, monitors and procedures for handling incidents.

MARSEC Levels advise the maritime community and the public of the level of risk to the maritime elements of the national transportation system. Ports, under direction of the local Captain of the Port, will respond to changes in the MARSEC Level by implementing the measures specified in the FSP. Similarly, vessels and facilities shall implement the measures specified in their security plans for applicable MARSEC Levels. Regulations defining MARSEC Levels are in 33 CFR §101.200.

The USCG has a number of measures available to enforce security requirements and otherwise enhance security for vessels and port facilities in the United States. These measures include: conducting random and targeted patrols and vessel boardings; reviewing information contained in vessel arrival notifications; conducting escorts and targeted boardings of vessels identified as high risk; conducting background intelligence checks; establishing safety and security zones when needed; reviewing, approving, and exercising vessel and facility security plans; and other appropriate actions designed to improve maritime security. Regulations regarding the Declaration of Security that must be given by the tanker prior to arrival can be referenced in 33 CFR §105.245.

14.2.3 Proposed Project Construction & Decommissioning Impacts

14.2.3.1 Onshore

Onshore construction of the Proposed Project will not impact navigation as there are no navigable channels crossed by the onshore project components.

During onshore construction, the construction corridor will be actively monitored for security and safety concerns. Additionally, access to the surrounding area will be limited to the private landowner or Project personnel. During operation, it is unlikely that the public will be exposed to any safety hazards as a result of the of the onshore components construction or decommissioning.

14.2.3.2 Inshore

The proposed Project traverses the Gulf Intracoastal Waterway (GIWW) and the Lydia Ann Channel, and runs parallel to the Aransas Channel. To minimize potential impacts to the navigational channels, the applicant will install channel crossings of the inshore pipelines using HDD, as described within Appendix A: Construction, Operation and Decommissioning Procedures. The construction of the inshore pipelines will be sequential. During the inshore pipeline construction time, waters in proximity to construction vessels will be inaccessible to other users of the GIWW.

Temporary safety zones during installation of the Project will not likely have a significant effect on commercial shipping or activities in the area. Commercial vessels are too large to transit into the GIWW areas where the HDD crossings are located. These channels have a controlling depth of 12 ft. Tugs, special craft, recreational, and fishing vessels may utilize these routes and could be impacted for a period of time. Any vessels that transit through the Project vicinity during installation would be forced to navigate around the safety zones, increasing the time that it would take them to move through the area and reach their destination. Any vessels that utilize the areas that will be off-limits due to safety zones, could use an alternate route, if available. The duration that these areas would be off-limits is a maximum of 9 weeks per crossing.

Impacts to navigation and navigation safety during decommissioning are anticipated to be similar to those during construction but to a lesser extent as less vessel movements are anticipated during decommissioning than during construction. Safety zones will be established around construction vessels during decommissioning, as they were during construction. Once decommissioning is complete, the safety zone would no longer apply and activities in these areas would resume.

It is possible for sediment and erosion runoff during construction of the pipeline and an increased potential for inadvertent returns of HDD fluids and inadvertent releases of hazardous materials. These events could potentially impact the public safety in recreational waters; however, the impact would be temporary with proper remediation of any hazardous spills.

During decommissioning there is potential for inadvertent releases due to operation of construction equipment. During pipeline removal, equipment in the water could cause a minor increase in turbidity and/or disturbance during pipeline removal.

Overall, with mitigation, such as stakeholder engagement and an ATN system, in place, impacts to navigation and navigation safety during decommissioning are anticipated to be temporary and of minor to negligible significance.

Impacts inshore during construction and decommissioning will have a short-term impact on local navigation as security zones, or restricted areas, will be placed around construction vessels or HDD installation equipment. At this time, there is no modular offloading dock or other material handling docks anticipated. Construction of onshore equipment for the onshore terminal, storage and booster station components will be constructed onshore and transported onshore. Use of barges or vessels will not be required.

During HDD drilling a release from construction or decommissioning equipment could occur, such as hydraulic oil or drilling fluids. In the GIWW, this could cause area closures for passing vessels to be extended for clean-up operations. The project will implement the Inadvertent Return Contingency Plan in any event of drilling mud release. Since drilling mud is a benign substance made of dense clay, it is anticipated that such a discharge would have a minimal impact to the environment and people and could have a medium impact to navigation.

14.2.3.3 Offshore

For details about the construction and decommissioning plan see Appendix A Construction, Operation and Decommissioning Procedures. During both construction and decommissioning additional vessels will be on site performing survey and installation activities. A pipelay vessel or barge will be required to install the offshore submarine pipelines to the buoys. The single point mooring (SPM) buoys will be fabricated within a controlled environment at an onshore facility and shipped to the designated location via a cargo ship. A construction vessel or multiple construction vessels will install the anchor piles, SPM buoy mooring system, PLEMs and hook-up of the buoys to the mooring lines and under-buoy hoses (marine flexible risers). The floating hoses can be assembled onshore or offshore and installed via one of the Project's dedicated supply vessels. Decommissioning would be similar in reverse order.

The additional construction vessels on the field will have temporary safety zones established around them in 500 m radius. This will have a very minimal impact on surrounding vessel traffic. Construction and decommissioning will be 24 hour per day operations in order to minimize the time of disturbance. The vessels will be equipped to maintain visibility by other vessels at night. This will include lights, audible alarms (fog horns), radio beacons, radar reflectors, as a minimum. Overall minor and temporary impacts are anticipated to navigation from the construction and decommissioning of the Proposed Project.

14.2.4 Proposed Project Operations Impacts

14.2.4.1 Onshore

During construction, operation and decommissioning, there will be no anticipated impacts onshore related to navigation.

Pipeline right of way (ROW) areas, where pipelines cross areas are run parallel to areas that are utilized by people, are marked with signage, fencing or other mechanism to prevent or deter interference with the pipeline. If these mechanisms are not maintained properly or people disobey them, it is possible for someone to be injured (for example someone traversing a pipeline and slipping and falling). Any equipment, such as valves that could be tampered with must have restricted access, such as locked gates or enclosures. These areas also need to be well maintained, checked and monitored.

If tampering with valves or other equipment occurs or if maintenance and replacement plans of seals or coating systems, for example, are not followed, leakage could occur. Product leaking from equipment that traverses the environment and shared spaces with the public can have an adverse impact to the environment. If it is a large amount it could create safety concerns, particularly if it occurs in a populated area. Safety concerns could be air quality or risk of ignition.

With proper planned maintenance and reliability planning and restricted access, the impact of the Project onshore, is anticipated to be minimal.

14.2.4.2 Inshore

Impacts from navigation inshore during operation will be minimal to none. The pipelines and HDD crossings in the GIWW and inland waters will be routed to minimize impact and will not reduce the controlling depths of the GIWW channels.

VLCC traffic loading offshore at the new deepwater port (DWP) could result in reductions in traffic volumes of smaller tankers inshore because reverse lightering would not be required to export the same volume. By potentially reducing volume of product being exported through reverse lightering, the Project could reduce the overall vessel traffic inshore by reducing the shuttle tanker traffic transiting between the lightering zones and Texas ports. This will depend on the demand and export volumes at the time the Proposed Project schedules its first cargo. Each fully loaded VLCC requires 3 to 5 smaller shuttle tanker transfers to offload a full cargo into port. The Proposed Project DWP has the capacity to replace export volume with fewer ships entering ports and greatly reducing inshore traffic. Fewer ships near US coasts, inland ports and other congested areas can reduce the likelihood of collision and impact to property and the environment.

Impacts to inland fishing and recreation can be found in Section 7 and Section 12.

14.2.4.3 Offshore Navigation Safety

The impacts of offshore navigation are discussed in this section in terms of risk associated with the vessels calling at the port impacting surrounding navigable waters and in terms of surrounding vessels impacting the safety of the vessels calling at the port. Other impacts due to navigation of tankers in the Proposed Project Areas could include grounding, collision/allision, loss of stability, material failures, loss of power, loss of station or mooring, oil spill, fire or explosion. The causes or risks associated with these impacts are discussed in this section as well.

Support vessels, or heavy-duty tugs, will be utilized to mitigate risk and improve safety in the Proposed Project Area. The training of personnel on operating the tugs and on the operation of the DWP, will be imperative for maintaining safe operations offshore at the DWP. There are inherent risks in operating offshore such as changing weather conditions, personnel transfers, mooring and unmooring, connection of hoses, start-up of the loading operation. Officers on watch will be highly trained and experienced professionals with well documented procedures for

conducting different types of operations and communication deficiencies. If the procedures are not followed impacts could be severe, such as injury to personnel, damage of property, release of product, or fire.

Because the Project will follow all industry guidelines related to safety management systems, training and competency, and require strict management policies for the tug operator, impacts on navigation, safety and security from the tugs is thought to be minimal.

14.2.4.3.1 COLLISION

Areas to be avoided (ATBA) and safety zones are proposed around the SPM buoys. If accepted, the zones will be added to the nautical charts to inform surrounding vessel traffic of the obstruction and to eliminate the risk of other types of vessels from entering the area while a tanker is loading.

Safety zones are being proposed around each buoy of 1,100 m in diameter. Buoy System 1 is 2 to 3 nautical miles to the Aransas Pass Fairway Anchorage. A no anchoring area (NAA) and area to be avoided (ATBA) is being proposed an additional 250 m outside the safety zone. The Buoys are approximately 0.8 nautical miles from the boundary of the nearest navigational fairway.

The SPM buoys and the hoses will have lights for visibility in the dark. The SPM buoy has a radar reflector so that it can be seen by nearby vessels and the approaching tanker. A stand-by tug will be patrolling the marine site 24 hours a day, to ensure passing vessels do not enter the safety zone. The Applicant does not intend to request private aids to navigation under the provisions of 33 CFR 149.510. As discussed above, distances from the Aransas Pass Buoy are 17.25 nautical miles to SPM Buoy System 1 and 18.5 nautical miles to SPM Buoy System 2, respectively.

Refer to Appendix A for a drawing that shows the marine site layout in relation to existing fairways and the Aransas Pass anchorage area.

The DWP is located upwind of the anchorage. This is favorable for reducing risk of collision with the buoy from vessels drifting off anchor. The prevailing weather would push tankers at anchor west, away from the deepwater port. This is also true for a vessel that could lose power in the shipping lane. The shipping lane that is adjacent to the DWP safety zones is downwind. Support tugs will be onsite during all operational periods when a vessel is within the DWP safety zones.

Conversely, if a tanker at the SPM has an emergency disconnect and is blown off station, it could drift in the direction of the anchorage. This risk is mitigated through the use of 2 tugs of sufficient capacity to hold the tanker on station until the tanker can depart on its own power. The tanker will have its main engines idling during loading, in case an incident occurs, and the tanker needs to maneuver on its own power.

Collision risks offshore during mooring and hose connection are mitigated through the use of highly trained personnel. Two mooring masters will be utilized during the operation (see section (m) for a description). The mooring masters are trained and meet experience requirements as set out in the OCIMF Competence Assurance Guidelines for Mooring, Loading and Lightering Masters. At one 7,000-8,000 hp Zdrive tug and one smaller line handling vessel will be on station during mooring and unmooring operations (per SPM) to assist the tanker as needed and respond to emergencies.

If a collision occurs in a safety fairway or at the anchorage, those areas could be shut down and disrupt traffic. Collision can cause a series of other casualties including mechanical failure, flooding of compartments, loss of stability, fire or explosion, injury, pollution to air or water. If collision occurs the impacts can be severe or even catastrophic. For this reason, there are mitigating measures in all levels of operation to prevent collision including design of equipment, training of personnel, communication protocols, visual aids, audible alarms (fog horns), radar and voyage charting, and many others.

Impacts from collisions can be severe, however the risk of collision is reduced by ensuring visibility of the DWP, active patrol vessels restricting access, well trained and experience personnel, and proper communication during offshore operations.

14.2.4.3.2 SPM BUOY COLLISION DATA

Collisions with SPM buoys are very rare. Anecdotal data was received from an SPM buoy manufacturer indicating the highest likelihood of a collision is from a tanker during very benign weather conditions, when the hawser is slack. Based on experience, the manufacturer and on inspection findings, this very low impact collision has resulted in minor damage to the buoy skirt and/or fenders. In extremely rare cases it is known that private vessels operating at night without the proper navigational equipment on board have collided with buoys and have experienced significant damage, with little impact to the buoy. Measures are in place to minimize the risk of collision by vessel offshore, including lights on the buoy and floating hoses. Impacts due to collisions with the SPM buoy is anticipated as minimal to none.

14.2.4.3.3 GROUNDING

Under-keel Clearance (UKC) is the distance from the bottom, or keel, of the tanker to the sea floor. The UKC changes depending on the draft of the vessel. A UKC margin is required to maintain a safe draft. The deepest draft plus the UKC margin is the minimum water depth required at the DWP.

When the tanker arrives at the DWP, it will be in ballast draft condition. During loading, the draft will change and upon departure from the DWP the tanker will be in a fully loaded draft condition. This is usually the deepest operational draft. Sea water and cargo properties, including temperature and density, are factors in calculating the draft. The design drafts for a class of tankers are established during design and are reviewed by the Classification Society.

For a characteristic VLCC size vessel, the maximum size expected to load at the DWP, the tropical load line draft is approximately 21.7 m or 71.2 ft.

Table 14-5 Average Oil Vessel Types and Sizes

	Suezmax	VLCC
Deadweight (metric tons)	156,000	308,000
Length overall (m)	274.6	333.0
Beam (m)	48.1	59.8
Loaded Draft (m)	16.9	21.7

Using a 10% UKC Margin, the required depth is 83.7 ft. The depth at the SPM buoy is approximately 88.5 ft, leaving about 5.3 ft of additional clearance.

The Feasibility Mooring Study provided in Volume I of this DWPL application verifies the required water depth above by calculating the motions of the tanker and monitoring the depth of the keel relative to the sea floor. The calculations yield 2.7 ft of additional draft at the stern when taking into account vessel motions and trim. By adding the tropical loadline draft, additional draft due to motions and trim and a 5 ft. UKC (USCG 33 CFR §150.340) then the required depth is 83.8 ft. This is comparable to the required water depth above, using only draft and 10% UKC margin.

The risk of grounding is mitigated through a 5-10% under keel clearance margin that is set by the tanker operator in addition to the maximum draft of the vessel. Information such as this and other essential tanker operational information is communicated in the series of notifications (see Marine Operations Manual) that the tanker must follow as part of the contract with the DWP.

Therefore, impacts due to the risk of grounding from tankers calling at the DWP, will be minimal to none.

14.2.4.3.4 MARINE TRAFFIC

As discussed above in the section on vessel traffic, the adjacent shipping lane and surrounding areas are heavily trafficked by several different vessel types including tankers, tugs and cargo ships. The impact of the Proposed Project to the existing tanker traffic will be minimal. The DWP expects, at a maximum, 16 ships per month or 192 ships per year. More than 5,000 ships per year arrive at Aransas Pass, thus an additional maximum of 192 is thought to be only a negligible or minor impact.

The DWP is designed for simultaneous loading at the 2 buoys. The expected maximum number of port calls will be 8 tankers per month per buoy. This is about 1 tanker every 2 days, on average. The DWP is located east of the Aransas Pass Fairway Anchorage adjacent to a shipping lane that runs northeast to southwest from Matagorda Bay. Based on traffic density maps and discussions with a local pilots, this lane is primarily used for regional transits of tugs and other service vessels. Commercial vessels, including tankers are likely to approach from the southern shipping lane, traveling northwest to the Aransas Pass sea buoy or to the anchorage.

The Project is not located within any lightering areas. Navigation to and from lightering areas is assumed to occur within the designated Navigation Fairways. Construction, operations, navigation, or decommissioning activities of the Project will not interfere with passage of vessels to or from the lightering area nor will it interfere with vessels utilizing the lightering area at any time.

14.2.4.3.5 SPM BUOY THIRD PARTY HAZARDS

Third-party vessels that will enter the safety zone to service the tanker are not anticipated. During normal loading operations, the tanker and 2 tugs will be in the safety zone. Operations procedures, including communication with the DWP and notification to authorities, will be detailed in the Marine Operations Manual. Regulations regarding notifications for Deepwater Ports are in 33 CFR Subchapter NN Subpart D Vessel Navigation.

During special survey of the SPM equipment (every 2-5 years, after an incident, or as needed), special operations will take place where a dive or remote operated vehicle support vessel will be utilized to conduct under water survey/inspection of the buoy. There is a slight chance that third-party vessels could collide with the SPM during these special operations; however, collision risks are mitigated through safety precautions and communications procedures such as the aids to navigation (obstruction lights, sound signals, radar reflector), establishing the safety zone, scheduled notifications to the DWP person in charge, and regulations governing safe navigation.

Because third party vessels are not anticipated during normal operation, the impacts from such vessels on navigation, safety and security are thought to be minimal to none. If required for emergency or planned maintenance, these vessels would be in the surrounding area very infrequently and during times when the DWP will be shutdown, the impacts are thought to be minimal. These minimal impacts could include injury from transfer of personnel to/from the buoy or collision with the buoy if weather conditions change suddenly or there is an operational error.

14.2.4.4 Offshore Safety & Security

Because the DWP is located offshore, it will have little impact to public safety onshore during routine operations. Vessels, commercial or recreational, should not be near the SPM buoy system due to the proposed safety zone around the SPM buoy. The proposed safety zone will be federally regulated by the USCG and will be added to the nautical charts. Additionally, the SPM buoy and floating offloading hoses are lighted to prevent collisions with other marine traffic offshore.

The DWP is unmanned and will not have any normal discharges associated with hoteling/accommodation that an offshore platform may have. There is no fuel power generation on board, only batteries to operate

telecommunications equipment, thus there is no fuel, cooling water or emissions associated with the buoy that may impact recreational fishing or the public.

The mooring lines and anchors or piles will be below sea level and extend outward from the buoy position. An area to be avoided will be established. All floating hoses will have winker lights to be visible at night to passing vessels. The mooring system will be within the safety zone and will have a negligible impact.

14.2.4.4.1 MARINE ASSURANCE & VETTING

Crude oil tanker design integrity is ensured through the system of Classification. The International Association of Classification Societies sets the rules and guides for Classification. A valid classification society certificate will be a requirement for tankers contracted to load at the DWP.

The tankers are vetted through the DWP operator's vetting requirements: The applicant's Ship Vetting Policy requires at a minimum the following:

- Q88 not more than 30 days old
- USCG Certificate of Compliance (COC)
- Valid International Ship Security Certificate (ISSC)
- Valid Civil Liability Convention Certificate
- Valid member or associate member of the International Association of Classification Societies (IACS)
- Current International Group Protection and Indemnity (P&I) Club certificate
- Vessel no older than 20 years
- Vessels shall have at minimum one approved Ship Inspection Report Programme (SIRE) report within the last 6 months
- All vessels must be double hulled
- All vessels must have P&I insurance cover
- All vessels must have no groundings, pollution, causalities, or collisions within the last 12 months
- Vessel must be in compliance with ISM Code
- Vessel must not have been detained by Port State Control within the last 24 months
- Vessel must be owned by a member of the International Tanker Owners Pollution Federation Ltd
- Prior 3 cargoes screened prior to acceptance

The United States Coast Guard (USCG) Certificate of Compliance (COC), as described above, also requires the tanker is in good standing with the vessel classifying society, has a valid Classification certificate, and USCG Certificate of Inspection (COI) Applicable provisions for a COI are provided in 46 CFR §31.05-1.

Tanker operations, if mismanaged can have a severe impact on safety and security. For example, a tanker operator could cause a casualty from not following communication protocols, not maintaining equipment properly, not mooring the vessel properly, inadvertently discharging substances on board to sea, etc. These examples of negligence or mismanagement are mitigated through the Applicant's Marine Assurance and Vetting program, where tankers are selected based on a predetermined set of criteria, audit and inspection. Because of the proven tanker operating procedures and vessel selection criteria, impact on safety and security from the tanker or 3rd party vessels is thought to be minimal.

14.2.4.4.2 SPM BUOY

The SPM buoy and its mooring system will be designed and built under classification by an IACS approved Classification Society as well as a USCG approved certifying entity.

The SPM buoy will be unmanned. Boarding the SPM buoy will be done for maintenance and inspection purposes only with careful planning. A maintenance and inspection plan will also be reviewed by the Classification Society and

the certifying entity that will prescribe inspection frequency and critical spare parts. Safety and health requirements for the DWP are covered in 33 CFR Subchapter NN Subpart G.

14.2.4.4.3 OFFSHORE PIPELINE SAFETY

Fabrication, installation, testing and commissioning procedures and details are described in Appendix A, Construction, Operation, and Decommissioning Procedures. All pipelines are to be designed, operated, and maintained in accordance with all current and applicable standards and regulations.

Additionally, design and operation strategies taken into consideration to decrease the safety risks associated with the offshore pipelines include burying pipelines a minimum of 3 ft below the seabed and utilizing HDD pipeline sections to reduce interference with navigation, other pipelines, or sensitive areas that could lead to increased safety hazards.

The proposed offshore pipeline route was selected during preliminary engineering, following extensive geophysical, geological, archeological, and hazard surveys. Such surveys and studies were conducted while designing the pipeline to ensure the offshore pipeline avoids all potential hazards and is designed to be as stable and safe as practicable.

An anchor or net snagging the pipeline risers or interconnection junctions could result in damage to the Project's infrastructure or the third-party vessel. The Safety Zone, ATBA, NAA, and Port Operations Manual vessel traffic monitoring and warning procedures would minimize the risk of such incidents.

Damage from outside forces poses the greatest threat to pipeline safety. The Bureau of Safety and Environmental Enforcement (BSEE) and the United States Department of Transportation (USDOT) Office of Pipeline Safety, require subsea pipelines to be constructed and operated with specifications that minimize these outside forces. A valve station would be located at the Harbor Island Booster Station. The proposed Harbor Island Booster Station would consist of shut off valves to allow for the isolation of offshore and onshore sections of the proposed pipeline infrastructure during emergencies such as pipeline break or leak, and routine maintenance and inspection operations. The Harbor Island Booster Station would house two 30-inch-diameter full bore 300 series motor operated valves designed to close upon sudden rise or fall of pipeline pressure. In the situation of a pressure drop or increase within the pipelines, communications equipment would be utilized for the emergency shut down of pumps located at the booster station.

14.2.4.4.4 PUBLIC SAFETY

Tankers are an integral part to the GOM economy and transportation system. There are several thousand port calls each year that utilize the safety fairways in the GOM while traveling to ports. The DWP for this Project is adjacent to a navigational fairway. The tankers will not need to enter Aransas Pass and will remain outside the 12-nautical mile territorial seas boundary. Tankers will travel from the southern fairway and pick up pilots via support vessels before proceeding to the DWP. The tankers will only operate offshore, and will therefore, have very little to no impact to the public safety nearshore and onshore during normal operations.

14.2.4.4.5 OIL SPILL

The section below presents an overview of oil spill risk and consequence analysis for the Proposed Project. Detailed oil spill trajectory modeling, tactical response planning, and a Draft Oil Spill Response Plan can be referenced in Volume I of this Deepwater Port License (DWPL) application.

The main function of the DWP and of the Project is the export of crude oil. This will be done by loading VLCCs, up to two simultaneously, with approximately 2,000,000 barrels (bbls) of crude oil each. The loading rate is up to 80,000 bbls/hour. The crude oil will load through two floating, flexible oil loading hoses from the SPM buoy to the tanker manifold.

During loading operation, a heavy boom will be deployed by the heavy-duty tugs around the tanker and hoses. It is federal law that any amount of oil seen in the water, or even on the side of the tanker, be immediately reported via the National Response Center Hotline and the Applicant also has strict reporting procedures to mobilize response efforts as soon as possible. The boom is deployed, in the rare event that there is an incident, to contain the discharge so that it can be recovered. The purpose-built heavy-duty tugs/support vessels will have oil recovery capability and can respond to a discharge, reducing impact to the environment.

If crude oil were to be accidentally discharged to sea due to a casualty, such as a collision, the Proposed Project has heavy boom deployed during loading that can keep the crude from dispersing, making it easier to recover and preventing it from reaching the shoreline. The most severe impact an oil spill occurs when oil reaches the shallow water and shoreline. The support vessels/tugs on station will be equipped with oil recovery equipment to quickly respond to an incident and minimize impacts. A spill trajectory model was used to evaluate the impacts of a calculated worst case discharge; the modeling efforts are discussed below in the Mitigation of Proposed Project impacts section. The model is used to create a tactical plan for respond to an oil spill, including ensuring the required equipment is available and planning what equipment will be deployed and specifically where it will be deployed to reduce impacts.

The risk of a release from the pipeline is low as the pipeline is buried 3 feet under the soil. Leaks could occur from valves or flanges; however, the buried pipeline is completely welded offshore as a closed system. As long as the pipeline is maintained properly, no leaks are anticipated to occur. A vessel anchor dragging or dropped object could cause a leak, but the likelihood is very low. The pipeline location will be marked on the nautical charts and the pipeline is routed around the anchorage to minimize and avoid this risk. Occasionally tankers that have lost power will drop anchor; however, due to the prevailing whether directions it is likely vessels in the fairway or anchorage will drift away from the DWP.

While the likelihood of a casualty offshore that would cause an oil spill is low, the impact to the public and the environment could be great. For this reason, the Project goes to great measures to ensure the impact is minimized by a quick and thorough response.

14.2.4.4.6 FIRE & EXPLOSION

During loading operations, cargo tanks fill with crude oil and the tankers vent the gas inside of the tanks via the vent mast riser on the bow of the tanker. The vent mast riser tip has a flame arrester and is mounted outside the hazardous areas of the tanker. The cargo tanks are blanketed with inert gas (IG) during the ballast voyage to reduce the oxygen content in the tanks and avoid the risk of combustion. The inert gas is generated via an inert gas generation system and sometimes uses exhaust gases from the main engines. Impacts could include pollution to the environment from the gas or even fire if oxygen levels are too high and an ignition source is present. Because of the design of the system, including monitoring oxygen levels in the tanks and the elimination of ignition sources near the mast riser, and the procedures in place, impacts from the IG venting is thought to be minimal.

Static electricity is carefully designed to be grounded in the appropriate location and is not transferable through the loading hoses. This is designed intentionally and discussed in the International Guide for (ISGOTT) as well as the OCIMF Hose Guide.

14.2.4.4.7 OTHER POTENTIAL PUBLIC SAFETY HAZARDS

In addition to the items discussed above, the following governing laws and regulations were also considered for their applicability to the proposed Project and its potential impacts on public safety:

- Emergency Planning and Community Right-to-Know Act, 42 U.S.C. §§ 11001–11050, et seq.,
- Protection of Children from Environmental Health and Safety Risks, E.O. 13045, 62 FR 19885,
- Safe Drinking Water Act (SDWA), 42 U.S.C. §§ 300f et seq.

- Community Environmental Response Facilitation Act (CERFA), 42 U.S.C. §§ 9620, et seq.,
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), also commonly referred to as Superfund, Pub. L. 96–510, 26 U.S.C. §§ 4611, et seq., and
- Resource Conservation and Recovery Act of 1976 (RCRA), Pub. L. 94–580, 42 U.S.C. §§ 6901, et seq., Pub. L. 93–523, 42, U.S.C. §§ 201, et seq.

Technical surveys and resource evaluations have been conducted for the Proposed Project as discussed in other sections of this Environmental Evaluation. There has not been any information gathered during the planning and environmental evaluation of the proposed Project that leads the applicant to believe there is a risk to public health or safety as a result of the Project construction, operation, or decommissioning according to the above list of laws and regulations.

14.2.4.4.8 SECURITY

After the events of September 11, 2001, attention was focused on the prevention of terrorist attacks involving vessels and port facilities. This resulted in vast changes in operational procedures and new port security regulations. These changes substantially impacted the operating procedures of the USCG and owners of vessels and port facilities. The International Maritime Organization (IMO) also added Chapter 11-2 to the Safety of Life at Sea Convention, which included a new International Ship and Port Security Code. The SPM buoy will be unmanned; therefore, personnel safety offshore during normal operations will be a concern on the tanker, during the inspection of the buoy and associated equipment and on support vessels. Port Security requirements are prescribed in 33 CFR, Subchapter H Maritime Security, Part 105 Maritime Security: Facilities and the IMO International Ship and Port Facility Security Code (ISPS).

In the next phase of the Project a DWP Facility Security Plan (FSP) will be developed detailing the specific policies and procedures for the DWP in accordance with all applicable regulations. Drill and exercises must test the proficiency of facility personnel in assigned security duties at all U.S. Coast Guard Maritime Security (MARSEC) Levels and the effective implementation of the FSP. Maritime security plans and procedures at the facility will be detailed in the FSP including requirements in 33 CFR Part 106 and 33 CFR § 150.15 (x). The DWP will complete a Security Assessment and Develop an FSP, in accordance with the regulations. Under the regulations in Subpart H for facilities, the DWP operator must ensure the implementation of security measures for access control, newly hired employees, restricted areas, handling cargo, monitors and procedures for handling incidents.

MARSEC Levels advise the maritime community and the public of the level of risk to the maritime elements of the national transportation system. Ports, under direction of the local Captain of the Port, will respond to changes in the MARSEC Level by implementing the measures specified in the FSP. Similarly, vessels and facilities shall implement the measures specified in their security plans for applicable MARSEC Levels. Regulations defining MARSEC Levels are in 33 CFR §101.200.

The USCG performs a number of measures to enforce security requirements and enhance security of vessels and port facilities in the United States. These measures include: conducting random patrols, targeted patrols and vessel boardings; reviewing information contained in vessel arrival notifications; conducting escorts and targeted boardings of vessels identified as high risk; conducting background intelligence checks; establishing safety and security zones when needed; reviewing, approving, and exercising vessel and facility security plans; and other appropriate actions designed to improve maritime security. Regulations regarding the Declaration of Security that must be given by the tanker prior to arrival can be referenced in 33 CFR §105.245.

14.2.5 Summary of Proposed Project Impacts

During construction and decommissioning there may be some disruption to navigation due to GIWW and channel closures around construction vessels or due to a potential casualty. This impact will be for a short period of time and can be planned to reduce impact to surrounding vessel activity.

Vessel traffic and navigation in the offshore area at the DWP is not anticipated to impact the DWP or be impacted by the DWP in construction or decommissioning.

Closures around construction vessels or activities could have a minor and temporary impact on surrounding navigation in the channels and GIWW crossings as discussed above.

Spill or discharge from a construction or decommissioning vessel could have a minimal impact. These vessels, as long as they are operating professionally, should not pose a threat to the environment.

Navigation impacts onshore are not applicable. Impacts on navigation inshore during operation will be minimal to none. The pipelines and HDD crossings in the GIWW and inland waters will be routed to minimize impact and will not reduce the controlling depths of the GIWW channels.

Collision or grounding could have a significant impact; however, the risk of collision and grounding is mitigated by selecting a DWP location having greater than the minimum required water depth and located upwind of high traffic areas.

Vessel traffic and navigation in the offshore area at the DWP could have minimal to no impact on the DWP and minimal to no impact from the DWP during normal operation.

A minimal to severe impact on safety and security during all phases of the project could occur. If ROW crossings, markings and barriers are well maintained then the likelihood of security breaches and tampering will be minimal. If security and safety onshore are impacted by tampering or a breach of security, fire, oil spill, or vapor emissions could impact the environment or cause injury.

An oil spill onshore, inshore, or offshore, could have a significant impact on the public, area navigation, and the environment. For this reason, prevention and spill response planning are extremely important and a major focus of the Applicant.

Safety of personnel and property could be impacted if vessels and equipment are not designed, operated and maintained to a minimum standard. Classification societies and the USCG's certifying entities provide rules and oversight to ensure the design of the system meets the requirements. This ensures impacts from equipment failures, fire, loss of stability, and other casualties is reduced or avoided. The IMO is the regulatory body that promulgates laws pertaining to tanker operator standards, training and experience, as well as safety management systems.

Finally, impact on the marine traffic could be significant. If volume of product being exported stays the same, fewer vessels would be required to move the product and because tankers are currently loading offshore, traffic in port should be reduced. If volumes increase, traffic in port should still see a reduction. Reduced traffic in port and in crowded shipping channels should reduce likelihood of casualties.

14.3 Alternative Project

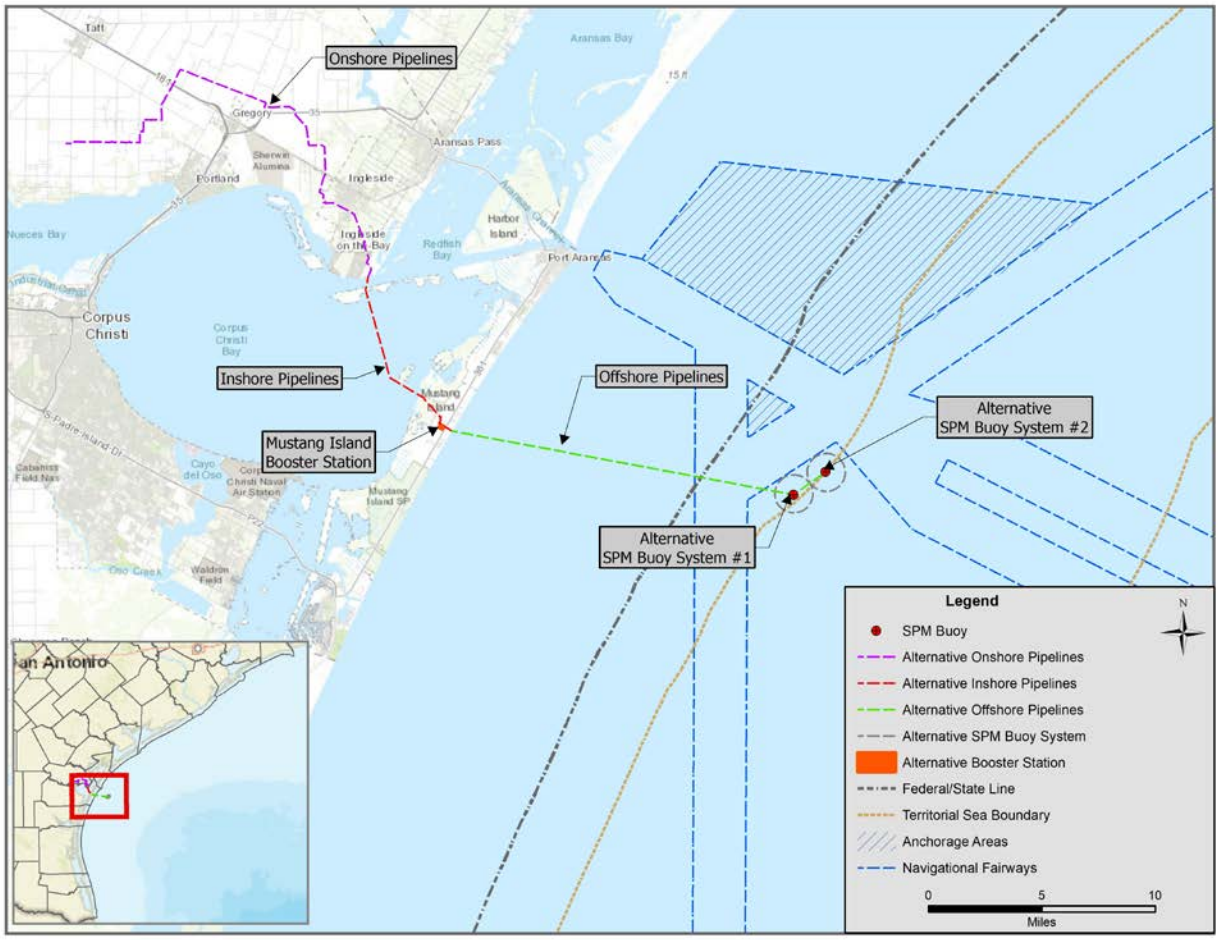
14.3.1 Alternative Project Area

For the purposes of this DWPL application, the Alternative Project is described in three distinguishable segments by locality including "offshore", "inshore", and "onshore".

Onshore components associated with the Alternative Project are defined as those components landward side of the western Corpus Christi Bay mean high tide (MHT) line, located in San Patricio and Nueces Counties, Texas. Onshore Alternative Project components includes approximately 23.08 miles of two (2) new 30-inch-diameter crude oil pipelines extending from the landward side of the MHT line of Corpus Christi Bay to a planned multi-use terminal located south of Taft in San Patricio County, Texas.

Inshore components associated with the Alternative Project are defined as those components located between the western Corpus Christi Bay MHT line and the MHT line located at the interface of Mustang Island and the Gulf of Mexico (GOM). Inshore Alternative Project components includes approximately 8.44 miles of two (2) new 30-inch-diameter crude oil pipelines, and an approximate 19-acre booster station located on Mustang Island.

Figure 14-11: Alternative Project Location Map



14.3.1.1 Onshore & Inshore

The Alternative Project components include an approximately 19-acre booster station and valve station located on Mustang Island, approximate coordinates of -97.1446, 27.7258, in Nueces County. The booster station would house the pumping infrastructure to support the transport of crude oils from the planned multi-use terminal facility to the Alternative Project SPM Buoy Systems through the proposed pipeline infrastructure.

The Mustang Island Booster Station would consist of two (2) pumping systems to service the two (2) 30-inch-diameter pipelines. The pumping systems will be comprised of four (4) electrically powered motors (approximately

5,500 horsepower (hp) each) in a series electronically locked into operation as two booster pumping systems delivering approximately 11,000 hp to each pipeline and would be located within a noise abatement pump house designed to minimize noise during operations to the maximum extent practicable. Included within the Mustang Island Booster Station design are manifolds equipped with by-pass lines for pigging operations and leakage metering. The Alternative Mustang Island Booster Station would also consist of two (2) 181,000 bbl crude oil storage tanks and two (2) 181,000 bbl water storage tanks.

14.3.1.2 Offshore

Offshore components associated with the Alternative Project are defined as those components located seaward of the mean high tide (MHT) line located at the interface of Mustang Island and the GOM. The Offshore Project components include approximately 17.07 miles of two (2) new 30-inch-diameter crude oil pipelines extending to two (2) SPM buoy systems.

The Alternative DWP consist of two (2) SPM buoy systems which would be installed offshore, within BOEM block numbers 769 and 768. The Alternative SPM Buoy System 1 is positioned at Latitude 27.6800556 and Longitude -96.8914861 within BOEM block number 769 approximately 13.38 nautical miles (15.4 statute miles) off the coast of Mustang Island in Nueces County, Texas. The Alternative SPM Buoy System 2 is positioned at Latitude 27.6941444 and Longitude -96.8685306, within BOEM block number 768 approximately 1.74 miles northeast of SPM Buoy System 1. The Alternative 17.07 miles of offshore pipeline infrastructure includes approximately 1.74 miles of two (2) 30-inch-diameter pipelines connecting Alternative SPM Buoy System 1 and 2. Of the 17.07 miles of offshore pipeline infrastructure, approximately 6.19 miles crosses the fairway beginning at Latitude 27.6922472 and Longitude -96.9625611 and ending at Latitude 27.6834944 and Longitude -96.9130417.

The offshore pipeline workspace is proposed to be a 75-foot-wide temporary construction workspace corridor for the jetting installation of the offshore pipelines to a minimum of 3-foot of cover. Where the Alternative offshore pipeline infrastructure crosses 3.1 miles of existing vessel safety fairway, the workspace remains at 75-foot-wide, however, the pipeline is required to be covered by a minimum of 10 ft of cover followed by the placement of rip-rap over the installed pipeline infrastructure located within the limits of the fairway. The additional depth of pipeline required in this section would require additional jet sled passes. The rip-rap will be transported in via barges and lowered to the trench using clamshells and winches.

The Alternative Project SPM buoy systems consist of multiple components including a CALM system, pipeline end manifold (PLEM), mooring hawsers, floating hoses, and sub-marine hoses. The components of the SPM Buoy systems and the safety zones for the Alternative Project are arranged similarly and of same dimensions as the Proposed Project discussed above.

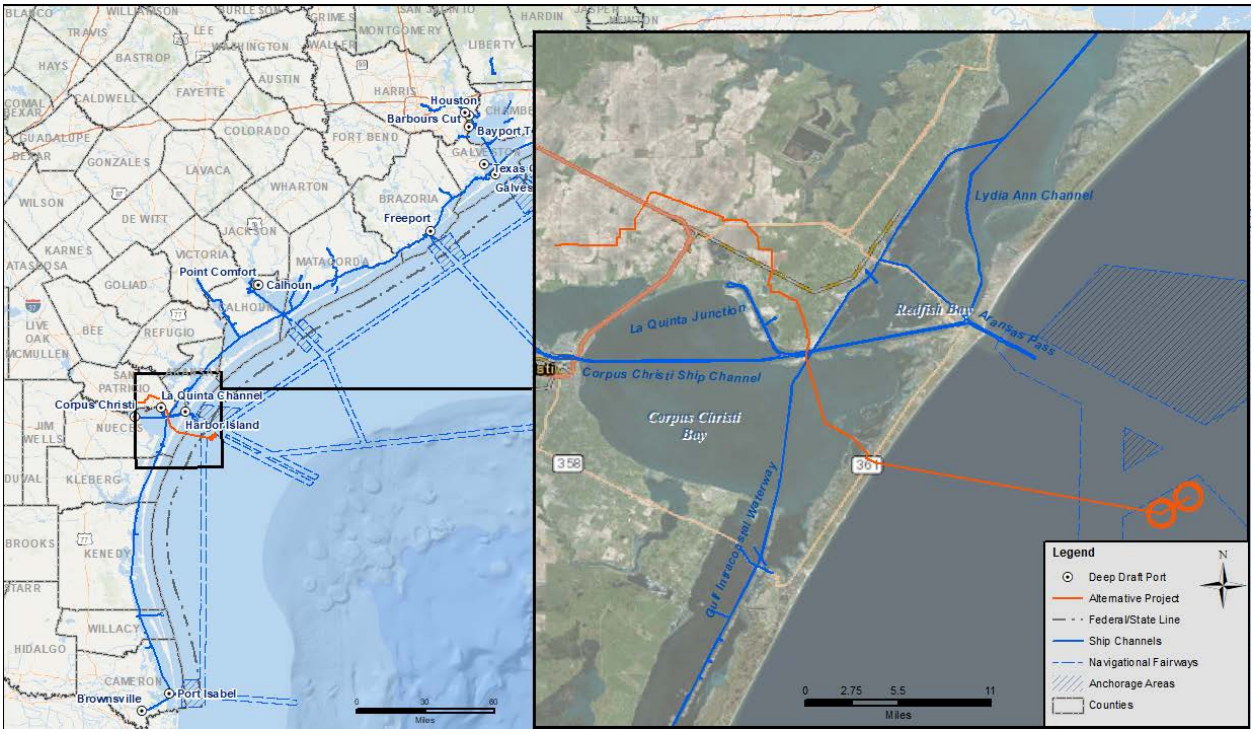
14.3.2 Alternative Project Area Existing Conditions

14.3.2.1 Inshore Navigation Conditions

14.3.2.1.1 NEARBY PORTS

The entrance to Aransas Pass channel is approximately 12 nm northwest of the SPM Buoy No. 1. Port Aransas is located on the south side of Aransas Pass Channel and is closest to the DWP. The Port at Ingleside, Texas is the next closest, about 29 nautical miles and is inside Corpus Christi Bay. The Port of Corpus Christi (POCC) located approximately 39 miles to the west inside Corpus Christi Bay.

Figure 14-12: Channels in the Alternative Project Area



PORT OF CORPUS CHRISTI

The POCC is the largest port near the Alternative Project and is the fifth largest port in the United States (U.S.), providing access to the GOM, inland waterways, and offering connections to three railroad systems (POCC 2018). About 14 percent of the vessel calls to Texas ports in 2015 were to the POCC. Vessel calls to this port were also comprised mostly of tankers (67 percent) and included dry bulk (16 percent), gas (9 percent), and cargo (8 percent). Commercial shipping traffic en route to the POCC enters Aransas Pass from the Gulf Safety Fairway from the southeast. The POCC does not regularly receive cruise ships engaged in multi-day trips, thus, cruise ships do not typically use the shipping safety fairways near the Project.

INGLESIDE, TEXAS

The pipelines from the multi-use terminal crosses through Ingleside, Texas before reaching the inshore sections. The population of Ingleside, Texas was 9,400 in the 2010 census. The port of Ingleside is home to several large petroleum tank farms and 35 ft dept liquid dock (See NOAA Nautical Chart 11312).

14.3.2.1.2 INSHORE SHIPPING CHANNELS

THE GULF INTRACOASTAL WATERWAY

The GIWW is discussed above in section 14.2.2.1.2. In the Alternative Project, the inshore pipeline passes through Ingleside, Texas just to the east of a large tank farm, horizontal directional drilling (HDD) tunnels under the CCSC, transits a small island to the south and then crosses Corpus Christi Bay, the pipeline is trenched under the CCSC and two GIWW crossings. NOAA Chart No 11309 Corpus Christi Bay shows the GIWW.

HUMBLE BASIN TO LA QUINTA JUNCTION

The shipping channel, Humble Basin to La Quinta Junction, is described above in section 14.2.2.1.2 (See NOAA Nautical Chart 11307).

THE CORPUS CHRISTI SHIP CHANNEL

The CCSC is described above in section 14.2.2.1.2 (See NOAA Nautical Charts 11309 and 11312).

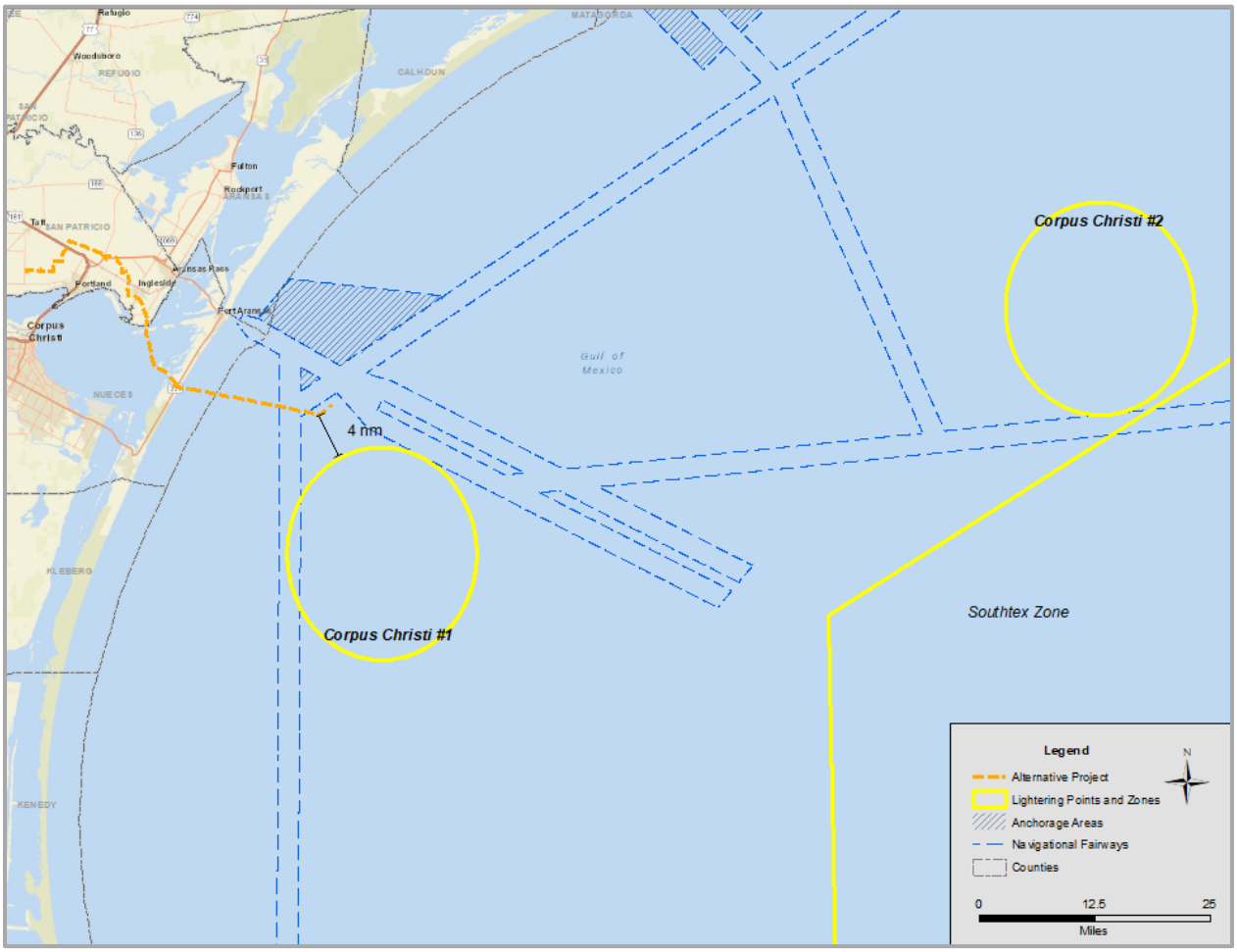
14.3.2.2 Offshore Navigation Fairways and Anchorages

The fairway anchorage is less than 4 miles from the Alternative Project Location. The Anchorage and the buoys are separated by the shipping fairway. This is a very high traffic area as tankers, cargo ships and other international traffic enter Aransas Pass headed in and out of the POCC via the shipping lane to the east. If vessels are waiting to enter the POCC they will utilize the fairway anchorage to the north. Prevailing weather is from the east, typically, varying in summer (typical southeasterly) and winter (typical northeasterly). This puts the Alternative Location in the path of any vessel that drifts off anchorage or course. See Figure 14-11 above.

14.3.2.2.1 LIGHTERING ZONES

The section above on lightering zones in the Proposed Project Area, also applies to the Alternative Project Area.The location of the closest lightering areas to the Alternative Project location is depicted in the figure below.

Figure 14-13: Alternative Project Distance to Lightering Areas



14.3.2.2.2 TANKER OPERATIONS

Conditions at the proposed location of the DWP are already acceptable for tankship operations. Water depth at the Alternative Location is approximately 88.5 ft. As discussed above the minimum water depth is 83.3 ft. this provides an additional 53 ft of clearance over the current margins. The water depth at the alternative location is acceptable for VLCC loading.

The SPM buoy system is designed to moor vessels up to maximum size of approximately 320,000 deadweight (DWT). Nominated vessels will be vetted against BWTT's Global Marine Vetting and Audit Criteria Summary (See references) and vessels must be a participant in the OCIMF Ship Inspection Report (SIRE) program with a SIRE inspection report no later than 12 months old. Foreign flagged vessels are required to have a USCG Certificate of Compliance (COC) for US DWP entry (46 CFR Part 154).

Vessel cargo manifold cranes are used to connect the loading hoses. Vessels smaller than 165,000 DWT usually do not have the crane capacity to lift the 20" diameter tail hoses, however if a smaller vessel has a 20 metric ton (MT) crane it may be considered. The use of 15 MT cranes will be reviewed based on the tanker's freeboard and other environmental factors. Vessel mooring equipment must comply with the OCIMF Recommendations for Equipment Employed in the Bow Mooring of Conventional Vessels at SPMs (2007) and to the OCIMF Single Point Mooring Maintenance and Operations Guide (2015) for connecting hoses and/or the Mooring Equipment Guidelines (4th Edition, 2018) that supersedes these documents.

There is a safety fairway that runs Northwest/Southeast, north of the Alternative Project DWP that leads to the approach into Aransas Pass and POCC. This safety fairway has two parallel lanes that is recommended for inbound and outbound traffic. This is the main route for tankers approaching the DWP from the GOM and internationally. The DWP is located approximately 2.2 nautical miles from the sea safety fairway (shown on Nautical Chart 11313 or 11300).

Tankers will pick up a mooring master either at the Aransas Pass Sea buoy or at anchorage. More information on the operation of tankers at the DWP is located in the Draft Marine Operations Manual.

14.3.2.3 Vessel Traffic

14.3.2.3.1 TRAFFIC DENSITY

The figures below are traffic density maps from Marine Cadastre which uses Automatic identification System (AIS) and Vessel Management System (VMS) signals to visualize the density around the Alternative Project Location. The below figures illustrate the heavy traffic in the vicinity of the Alternative Project location in 2017. The Port of Corpus Christi is expected to grow and increase throughput over the next few years.

The POCC currently has an authorized depth of 45 ft but has submitted proposals for dredging to 75 ft to allow VLCC traffic to enter. This may reduce the number of ships but could create more traffic at the anchorage if passing restrictions are put into place. More than 5000 tankers entered Aransas Pass in 2017. The following figures also show that the international traffic utilize the Southern Gulf Safety Fairway. Whereas the figure showing tugs and special craft shows these vessels primarily transiting locally use the sea fairway to the northeast.

Smaller vessels, such as pleasure craft and fishing vessel traffic are shown stay closer to shore, within about 12 nm, and do not follow a navigational pattern. They transit through safety zones and anchorages near and offshore.

Figure 14-14: 2017 Cargo Traffic in the Alternative Project Area

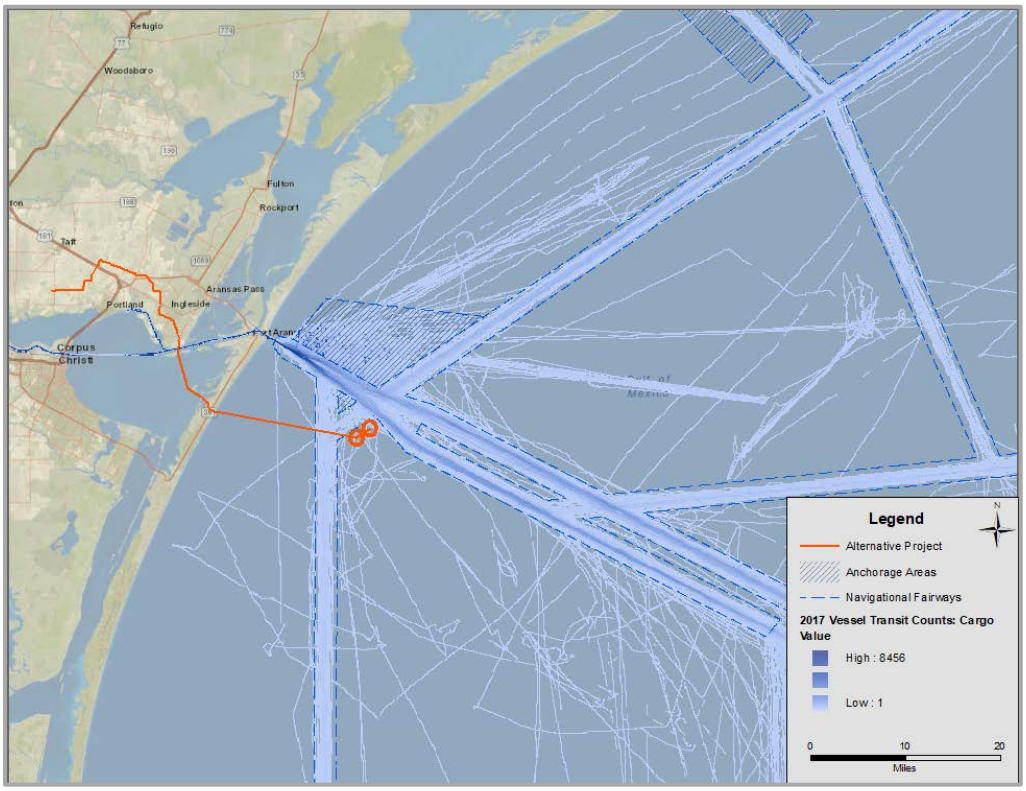


Figure 14-15: 2017 Tanker Traffic in the Alternative Project Area

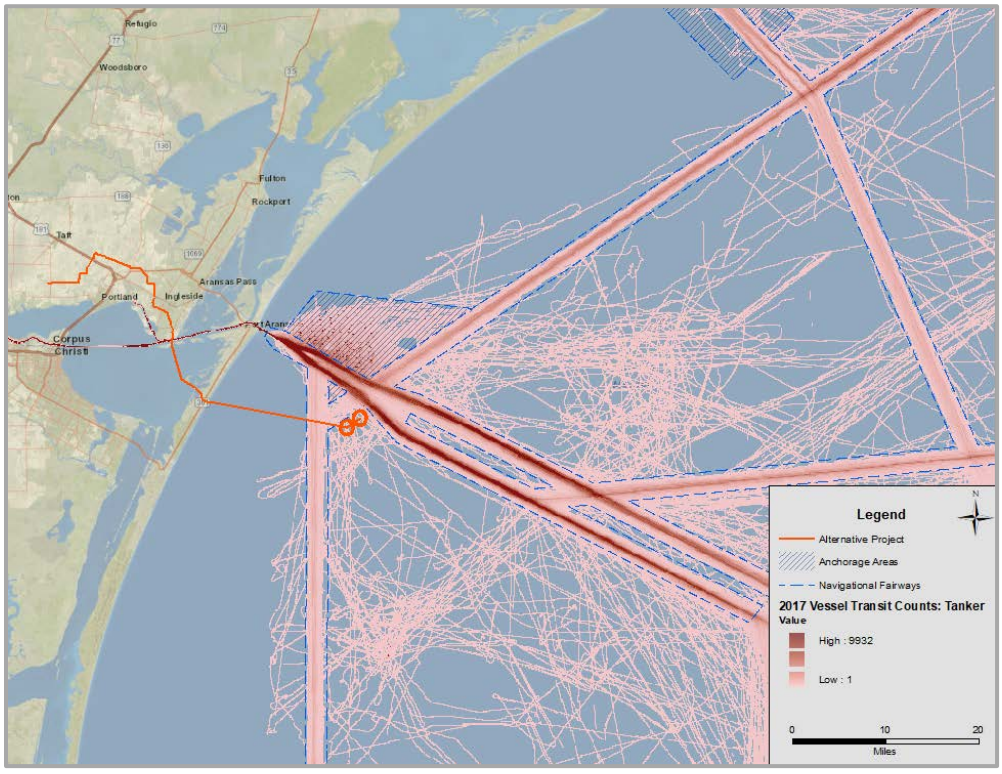


Figure 14-16: 2017 Tug and Tow Traffic in the Alternative Project Area

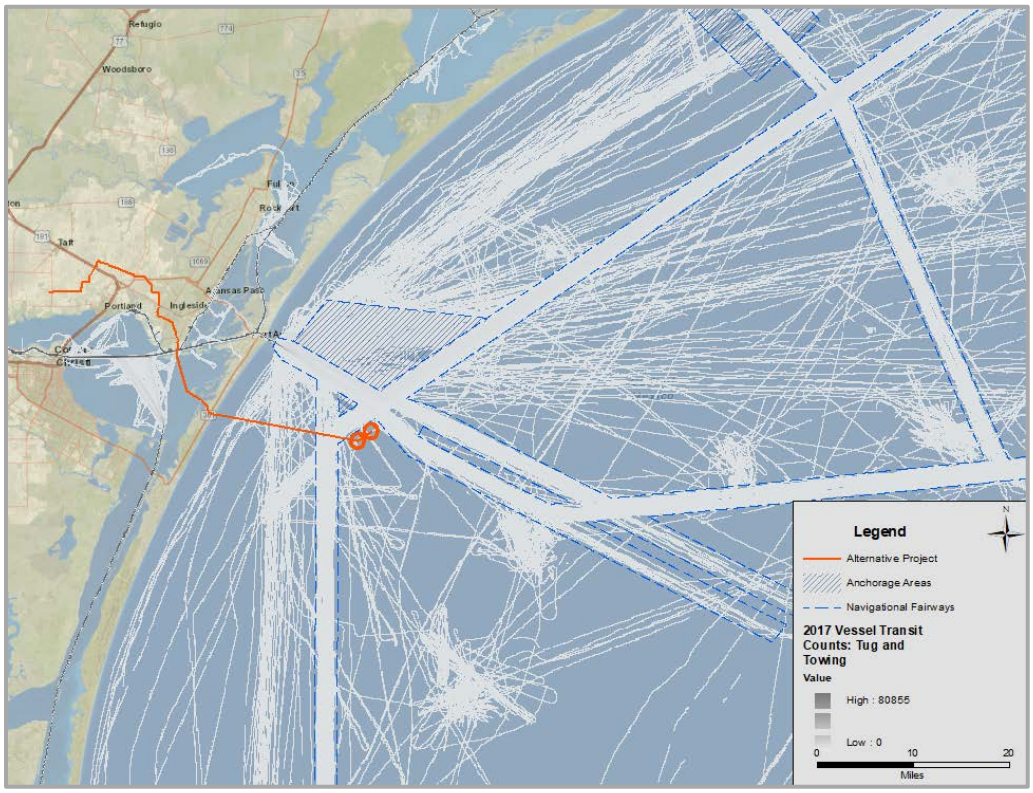
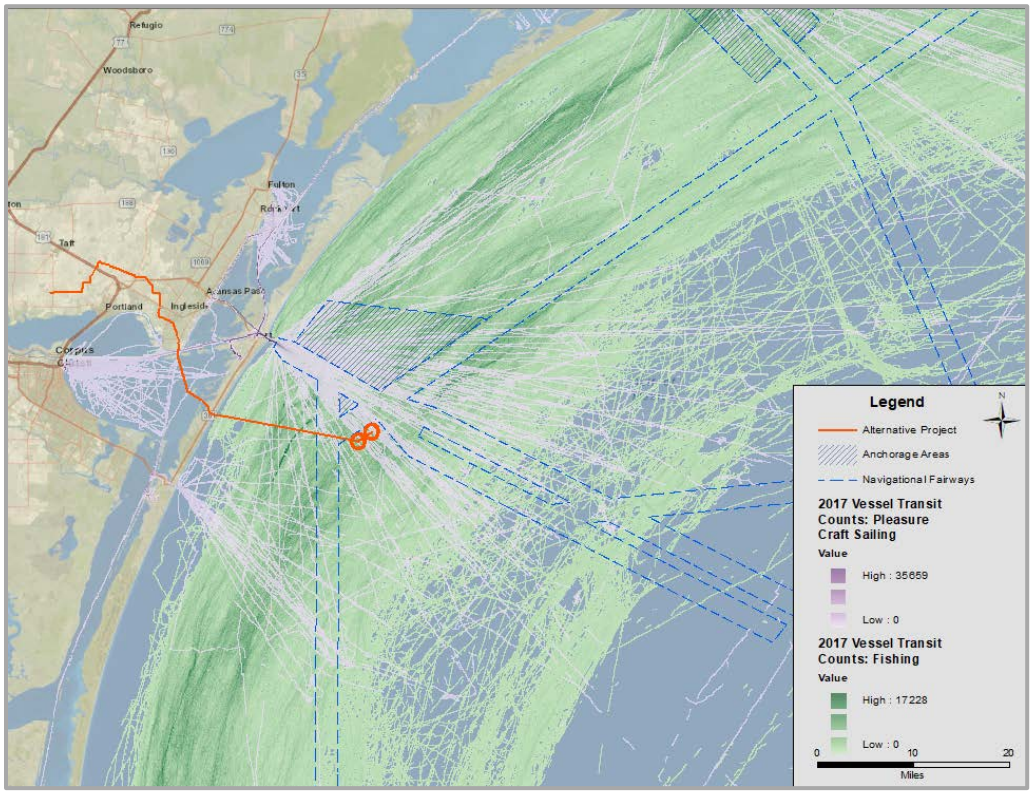


Figure 14-17: 2017 Pleasure Craft and Fishing Vessel Traffic in the Alternative Project Area



14.3.2.3.2 USCG CASUALTY DATA

As was done above for the Proposed Project location, the USCG MISLE database was evaluated for marine casualties in the area of the Alternative Project.

The SPM buoys have the following coordinates at the Alternative Location:

Table 14-6: Proposed Project SPM Buoy Locations

	Buoy No. 1	Buoy No. 2
Latitude	27.679715	27.694084
Longitude	-96.8919	-96.868634

The seven (7) files that include the casualty, pollution and injury data were each filtered by latitude and longitude. The data was filtered to eliminate entries outside 15nm around the buoys in 4 directions. The filtering criteria is as follows:

Table 14-7: Filter Criteria for MISLE data

	Greater than or equal to	Less than or equal to
Longitude	-97.1721	-96.5854
Latitude	27.4282	27.9456

Table 14-8: USCG Casualty database records

File Names	Number of Records	Number of unique events
MisleFacEvents.txt	36	35
MisleVslEvents.txt	462	287
MisleOtherEvents.txt	43	36
MisleInjury.txt	35	35
MisleFacPoll.txt	0	0
MisleVslPoll.txt	90	85
MisleOtherPoll.txt	137	133

The filtered files show significantly more records in the Alternative Location than in the Proposed Project Area. This could be because of the proximity to both shipping lanes and the anchorage. The 15nm area around the proposed location includes the entrance to Aransas Pass, the approach to the sea buoy from both shipping lanes, as well as the fairway anchorage. The Alternative Project area is in the center of the highly trafficked areas and for this reason is less desirable than the Proposed Project location.

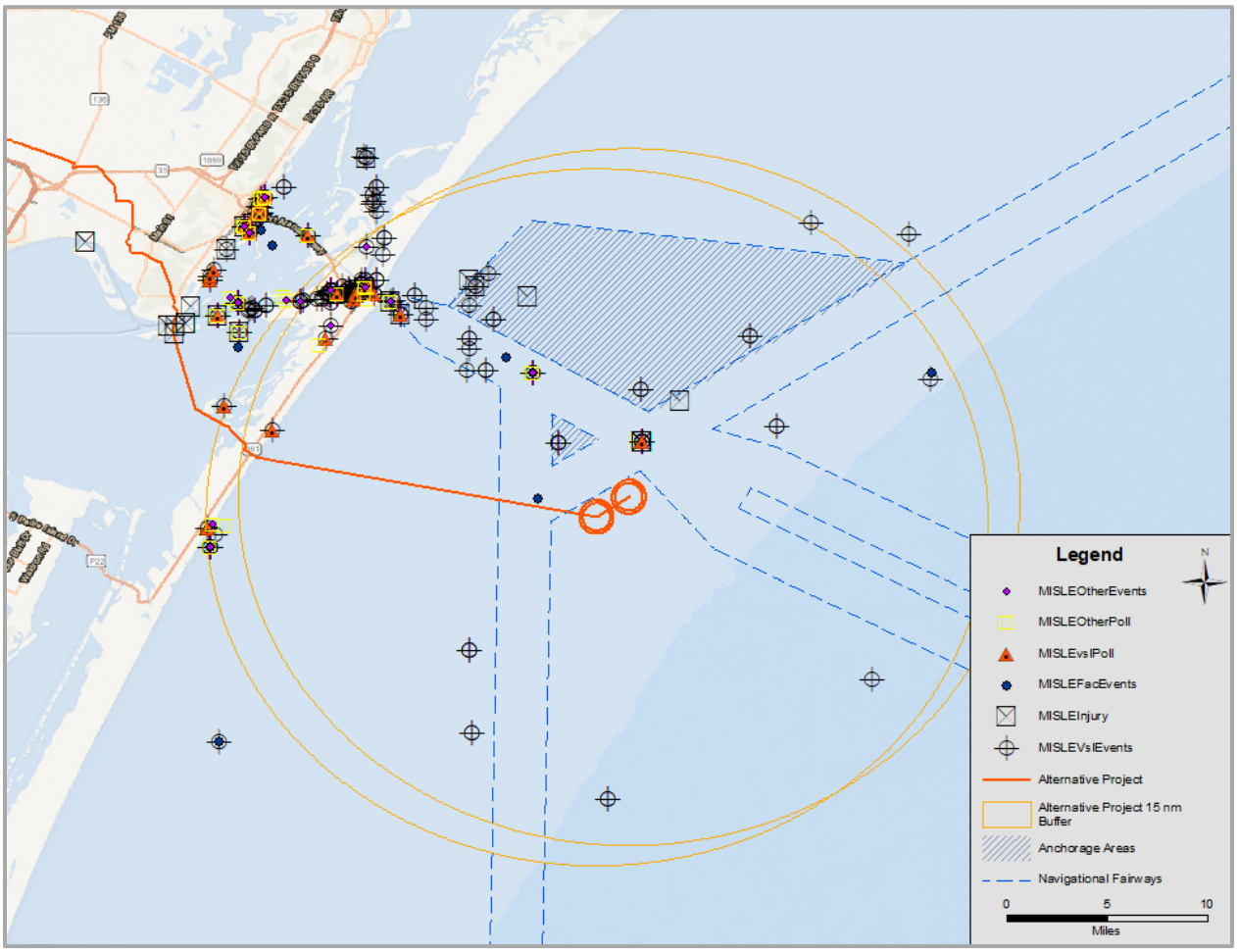


Figure 14-18: USGS MISLE Records for the Alternative Project Area

The total discharged amount of oil during the database time period for closed cases in the filtered area around the Proposed Project location is 21095.4 gallons.

The 462 vessel events were analyzed for event type and the results are shown in the below table. These events are the result of casualties experienced by 258 different vessels. They are only closed cases, as described above.

As compared with only 43 events in the area around the Proposed Project Location, this is a very large number including some catastrophic events.

Table 14-9 Vessel casualty events near the alternative Project Location

Material Failure (Vessels)	112
Vessel maneuverability	87
Damage to the Environment	86
Grounding	60
Allision	40
Collision	16
Loss of Electrical Power	11

Flooding	10
Emergency response	9
Sinking	7
Fire	6
Fouling	4
Abandonment	4
Set Adrift	3
Loss of Stability	2
Capsize	2
Damage to Cargo	1
Evasive Maneuvers	1
Explosion	1
Ferry	0
TOTAL	**462**

14.3.2.4 Safety & Security

The sections above regarding safety and security at the Proposed Project Area are the same existing conditions as found at the Alternative Project Area. The regulatory regime proposed navigational aids and restricted areas, and the equipment at the Alternative Project Area are all the same as the Proposed Project.

14.3.3 Alternative Project Construction & Decommissioning Impacts

14.3.3.1 Onshore

Onshore construction of the Alternative Project will not impact navigation as there are no navigable channels crossed by the onshore project components.

During onshore construction, the Alternative Project construction corridor would be actively monitored for security and safety concerns. Additionally, access to the surrounding area will be limited to the private landowner or Project personnel. During operation, it is unlikely that the public will be exposed to any safety hazards as a result of the onshore components construction or decommissioning.

14.3.3.2 Inshore

The Alternative Project inshore pipeline route crosses Corpus Christi Bay, beginning at Ingleside, Texas and crossing the CCSC. It continues south, crossing the GIWW in two places, before reaching Mustang Island. During construction of the pipeline, including the HDD sections specialty construction vessels and barges will be onsite. A safety zone will be established around these vessels and will restrict access in these areas. Construction will have a moderate, short term impact to navigation in these areas, particularly during the GIWW and channel crossings.

If a casualty occurs, such as a spill or loss of stability of a vessel being used in construction, the areas surrounding the incident would be shutdown. Recreational and fishing traffic is frequent in the bay and more difficult to control because of the experience of the operators of these vessels.

If oil or other contaminants were to spill during construction, there would be a significant impact on the shoreline of the bay and some environmentally sensitive areas.

The crossings in the Proposed Project area will have a lower impact as compared with the Alternative Project because the Proposed Project pipeline crossings inshore are in shallower water with less vessel traffic and fewer and shorter GIWW and channel crossings.

14.3.3.3 Offshore

Construction offshore at the Alternative Project location will require laying pipe under a major navigational fairway. This will have a short-term moderate to significant impact on marine traffic. The safety fairway is approximately 2 nm (3.1 m) wide and the safety zone around the construction vessel will likely be 500 m during pipelaying operation, buoy installation, mooring line installation and connection. If construction operation is conducted in the fairway, vessels will be required to change course around the work.

The Proposed Location does not require pipelaying under any major fairway and would have a lesser impact on Navigation and Marine traffic in the area, as compared with the Alternative Location.

14.3.4 Alternative Project Operation Impacts

14.3.4.1 Onshore

Onshore operation of the Alternative Project will not impact navigation as there are no navigable channels crossed by the onshore project components.

Surrounding land use of the onshore pipelines for the Alternative Project appear to be more industrial, specifically as the pipeline approaches Corpus Christi Bay through an industrial park. This proximity could negatively impact the safety of the onshore portions of the project due to the increased risk of incidents occurring in a heavily trafficked area that is crossed by multiple pipelines. Onshore pipelines will be marked and secured in similar nature to that of surrounding infrastructure and there is not anticipated to be any increased risk to public safety due to the pipelines.

14.3.4.2 Inshore

If a casualty occurs, such as a spill, from the inshore pipeline, the areas surrounding the incident would be shutdown. If oil were to spill during operation, there would be a significant impact on the shoreline of the bay and environmentally sensitive areas.

Because the bay is open water, an oil spill could be more difficult to contain and recover because of environmental factors. The pipeline routing in the Proposed Project includes several short crossings that are beneath small channels, where a spill could be contained with boom preventing oil from spreading to other shorelines or inlets. For this reason, the Proposed Project is preferred.

Because the inshore pipeline crosses the Corpus Christi Ship Channel, there are increased risks of potential pipeline interference during dredging or other pipeline crossings in the future. This risk is mitigated to the maximum extent possible with using HDD drilling for the pipeline installation in these areas. Additionally, if a spill were to occur in Corpus Christi Bay, there would be greater navigation and public safety impacts as the bay is a major source of fish and recreational fishing for the state.

14.3.4.3 Offshore

The Alternative Project location of the buoys is bordered on 3 sides by the shipping safety fairway. To get the required depth for VLCCs, the pipeline is required to cross the fairway; however, limiting the length of pipeline is best for reducing risk exposure as well as cost savings. Because of the location, and higher traffic area, the likelihood of a collision is slightly higher than the Proposed Location. The Alternative Project location is also downwind of the anchorage and main international traffic pattern into Aransas Pass, in prevailing weather conditions. This poses a risk if a vessel loses powering or steering or a vessel drifts off its anchor. For these reasons, the Proposed Project is preferred.

14.3.5 Summary of Alternative Project Impacts

A summary of impacts for both the Proposed Project and Alternative Project is presented in Table 14-10 Summary of Impacts below.

14.3.5.1 Navigation

There are no impacts to navigation onshore during construction, operation, or decommissioning for the Alternative Project as there are no navigable channels in this area.

During construction and decommissioning inshore there may be minor, short-term disruption to navigation due to GIWW and channel closures around construction vessels or due to an unlikely casualty. Project planning will reduce impact to surrounding vessel activity and navigation.

Vessel traffic and navigation in the offshore area at the Alternative Location could have a moderate impact to navigation during construction or decommissioning phases at the pipeline crossing of the sea fairway. During installation and removal of the pipeline, a safety zone around construction vessels will disrupt traffic patterns in the short-term and cause traffic into and out of Aransas Pass to re-route around the activities.

Spill or discharge from a construction or decommissioning vessel could have a minor to significant impact depending on the volume and type of discharge. These vessels, during normal operation, should have a negligible impact to the environment. If a spill were to occur, the Alternative Project area is less desirable as the inshore pipeline crosses the Corpus Christi Ship Channel, two GIWW crossings and crosses the Corpus Christi Bay north to south. If a spill occurs in a navigable channel, the channel will shut down for cleanup efforts. This could have a minor to significant impact, short term to the environment and to navigation. Open water areas, like Corpus Christi Bay, make oil recovery more challenging. For these reasons, the Proposed Location was chosen over the Alternative Location.

Impacts on navigation inshore during operation will be minor to negligible. The pipelines in Corpus Christi Bay are excavated to a depth of approximately 8 feet to allow for 60 inches (5 feet) of cover over top of the pipeline.

Collision or grounding offshore with the tanker or with the SPM buoy could have a significant impact. Grounding is mitigated through choosing a location with adequate under keel clearance in all tanker loading conditions. The Proposed Project Area is preferred over the Alternative Project because the Alternative Location is situated at a confluence of shipping fairways and in summer months is downwind of prevailing weather conditions from the sea fairway and during winter months is downwind of the anchorage.

Vessel traffic and navigation in the offshore area at the DWP could have minor to negligible impact on the DWP and minor to negligible impact from the DWP during normal operation. Commercial shipping traffic utilize the sea fairways in and out of Aransas Pass. Both the Proposed and the Alternative Projects are adjacent to fairways, however, the Alternative Project has fairways on 3 sides. For this reason, the Proposed Project is preferred.

14.3.5.2 Safety & Security

A minimal to severe impact on safety and security during all phases of the project could occur. If ROW crossings, markings and barriers are well maintained then the likelihood of security breaches and tampering will be minimal. If security and safety onshore are impacted by tampering or a breach of security, fire, oil spill, or vapor emissions could impact the environment or cause injury. This is the same for the Proposed Project and the Alternative Project.

Generally, the Alternative Project onshore pipeline presents less of a public safety due to the pipeline corridor being located primarily within agriculture and industrial areas, whereas the Proposed Project onshore pipeline crosses through some heavily populated residential areas near Port Aransas and Aransas.

Security offshore at the DWP is controlled by establishing Restricted Areas around the SPM buoys and actively patrolling these areas with the tugs. If these areas are not kept secure, other vessels could inadvertently enter and

collide with the buoy, hoses or tankers causing minor to significant impact to property and/or the environment or cause injury.

An oil spill onshore, inshore, or offshore, could have a significant impact on the public, area navigation, and the environment. For this reason, prevention and spill response planning are extremely important and a major focus of the Applicant. Spill response planning is used to mitigate the impact of an unlikely spill event. An oil spill in Corpus Christi Bay or the Corpus Christi Ship Channel, in the case of the Alternative project, could have a greater impact as the spill may be harder to contain and recover. For this reason, the Proposed Project is preferred.

The likelihood of collision near the Alternative Project location, due to higher traffic around the area, could be higher and for this reason it is less preferred.

Safety of personnel and property could be impacted if vessels and equipment are not designed operated and maintained to a minimum standard. Classification societies and the USCG's certifying entities provide rules and oversight to ensure that the design of the system meets the requirements. This ensures impacts from equipment failures, fire, loss of stability, and other casualties is reduced or avoided. The IMO is the regulatory body that promulgates laws pertaining to tanker operator standards, training and experience, as well as safety management systems.

14.4 Summary of Impacts

Table 14-10 Summary of Impacts

		Construction	Operation	Decommissioning
Proposed Project	**Onshore**	Not applicable to impacts to navigation. Poor maintenance or breach of barriers or ROW crossings not well marked could result in damage to equipment causing a release of product.	Minor risk of product release from pipeline at leak points such as valves or flanges. Not applicable to impacts to navigation. Poor maintenance or breach of barriers or ROW crossings not well marked could result in damage to equipment causing a release of product.	Not applicable to impacts to navigation. Poor maintenance or breach of barriers or ROW crossings not well marked could result in damage to equipment causing a release of product.
	Inshore	Poor maintenance or breach of barriers or ROW crossings not well marked could result in damage to equipment causing an inadvertent release of product.	Potential for inadvertent releases during operation of the Booster Station. Poor maintenance or breach of barriers or ROW crossings not well marked could result in damage to equipment causing a release of product.	Poor maintenance or breach of barriers or ROW crossings not well marked could result in damage to equipment causing a release of product.
	Offshore	Minor and short-term impacts to navigation due to channel closures or safety zones around construction vessels.	Some risk of operational oil spill. Reduced traffic in port and in crowded shipping channels should reduce likelihood of casualties.	Minor and short-term impacts to navigation due to channel closures or safety zones around construction vessels.
Alternative Project	**Onshore**	Not applicable to impacts to navigation.	Minor risk of product release from pipeline. Not applicable to impacts to navigation.	Potential increase in turbidity due to sediment disturbance from removing components. Not applicable to impacts to navigation.
	Inshore	Poor maintenance or breach of barriers or ROW crossings not well marked could result in damage to equipment causing a release of product. *Significant, short-term Impacts to navigation during construction in the Corpus Christi Ship Channel, Port of Ingleside, and GIWW crossings.	Potential for inadvertent releases during operation of the Booster Station. *Increased risk of vessel collision with pipeline in Corpus Christi Bay that could cause an oil spill.	Poor maintenance or breach of barriers or ROW crossings not well marked could result in damage to equipment causing a release of product. *Significant, short-term Impacts to navigation during construction in the Corpus Christi Ship Channel, Port of Ingleside, and GIWW crossings.
	Offshore	Not applicable to impacts to navigation. Poor maintenance or breach of barriers or ROW crossings not well marked could result in damage to equipment causing a release of product.	Minor risk of product release from pipeline at leak points such as valves or flanges. Not applicable to impacts to navigation. Poor maintenance or breach of barriers or ROW crossings not well marked could result in damage to equipment causing a release of product.	Not applicable to impacts to navigation. Poor maintenance or breach of barriers or ROW crossings not well marked could result in damage to equipment causing a release of product.

14.5 Mitigation of Proposed Project Impacts

14.5.1 Navigation

14.5.1.1 Site selection

A number of alternative Project locations were considered prior to the selection of the Proposed Project location and pipeline route. During the alternatives review and selection process, consideration was given to the avoidance of sensitive resources, such as navigation fairways. Section 2 'Alternative Analysis' of this report offers detailed information regarding the site selection and alternatives review.

14.5.1.2 HDD

To minimize potential impacts to coastal resources and navigation, the coastal crossing of the offshore pipelines will be installed using HDD, as described within Appendix A.

Training and Competent Personnel: Risks associated with navigation and navigation safety will be mitigated with employment of competent personnel and extensive training for those conducting the offshore operations. Industry guidelines, such as OCIMF, will be used to keep record of training and competence of personnel in critical positions.

14.5.1.3 Safety Zone

Risks due to other marine traffic in the area, considered low in likelihood, will be mitigated through establishing a safety zone around the DWP. The safety zone restricts vessel movement into the area where offshore operations are being conducted.

14.5.1.4 Navigation Aids

ATN system will be installed and maintained by the DWP owner/operator in accordance with the regulations in 33 CFR 66.

The DWP will have these types of aids to facilitate navigation and maritime safety:

- Obstruction light on the SPM
- Lights on floating hose strings
- A radar beacon (RACON)
- An approved sound signal

The specific design and installation requirements and the required characteristics for the aids will be as specified in 33 CFR Parts 62, 66, and 67.

14.5.1.5 Stakeholder Consultation

During Project installation/commissioning, the applicant will communicate with the USCG and US Army Corps of Engineers (USACE) Navigation Branch, and federal and local pilots regarding offshore Project installation activities. Prior to commencing installation, the applicant will communicate with the appropriate USCG personnel to ensure a Notice to Mariners is issued prior to any installation activity. The Notice to Mariners would alert vessel captains ahead of time about the location of the Project's temporary installation activities and the exact coordinates of restricted-access temporary safety zones around each installation site. Working vessels could also issue very high frequency (VHF) radio broadcasts, as needed, to alert passing vessels about the presence of temporary safety zones around each site of active installation. The temporary safety zones, themselves, would be mitigation measures to temporarily segregate marine uses in the area and prevent collisions, accidents, or other undesired interactions between Project installation activities and non-Project commercial or recreational vessel transits. The mitigation measures employed during decommissioning would be nearly identical to those used during installation, though the duration of decommissioning would be much shorter than installation/commissioning.

Proposed avoidance/minimization/mitigation for Proposed only, based on the selection in the summary above.

14.5.1.6 Support Vessels

In addition to well-planned and risk-assessed operations procedures and the 2 support tugs per buoy, tanker collision risks associated with berthing operations are mitigated through employing two (2) highly-trained mooring masters on-board the tanker to assist the tanker master. The mooring masters will be experienced tanker captains that are employed by the DWP and are intimately familiar with the DWP equipment, operations, personnel, and local navigational area and regulations.

Support vessels will include a 7000-8000 hp tug and a smaller line handling vessel at each SPM during mooring activity. These vessels will be capable of delivering the mooring hawser chain to the VLCC when it arrives at the DWP and towing the hose string into position near the VLCC's manifold. The line handling vessel will return to shore after mooring is complete, the tug will remain at the DWP in support of the loading vessel throughout the operation of the DWP. They will also provide transport and transfer of personnel to the vessel and some light towing duties. If two VLCCs are simultaneously at the DWP, then 2 tugs and 2 line handling vessels will be present. The support vessels will be on a dedicated, long-term contract by the Applicant, and will likely be built or modified for purpose.

14.5.2 Emergency & Spill Response Planning

To quantify the impacts of a potential oil spill at the DWP and associated offshore components and the subsequent response requirements, oil spill trajectory modeling was completed. A tactical response plan was completed to define the required equipment and the deployed locations to mitigate the impacts of a worst-case discharge scenario oil spill near the DWP. The full reports for both the trajectory models and the tactical response plans can be found in Volume I of this DWPL application

It is important to note that the trajectory modeling is done assuming no response team is deployed, meaning that no oil is being recovered or diverted in the model. In a real-life situation, teams would be mobilized immediately to start mitigation efforts. The discharge volume is also a calculated volume based on the entire content of the sub-marine pipeline, irrespective of the system features, designed to reduce the released volume during a failure in the system, such as shut-off valve locations and settings, sea bed bathymetry, and pipeline depth and routing.

The pipeline system will be designed to close shut-off valves and shutdown pumps within 30 seconds of detection that pressure is lost. A full HAZOP of the system will be completed during detail design, to ensure that the consequence of different credible scenarios and actions is mitigated to the lowest practical spill volume.

In the case of an incident on the tanker, very specific disconnect scenarios and actions will be defined for those personnel operating offshore through a formal risk assessment. This would include weather and hawser load disconnect scenarios, fire, spill, and cargo tank alarms, as an example. The SPM buoys are fitted with a telemetry system that communicates hawser tensions in real time to the mooring masters on board the tanker and ashore. A formal procedure for the tanker to disconnect will be defined if hawser tension alarms are triggered. The procedure will be activated if the hawser tension exceeds limits within certain time durations, also to be defined. These procedures mitigate the risk of hawser failure and tanker drift off, which could cause a collision or damage or disconnect of the hose and a potential product release. A procedure for loss of hawser tension will also be defined.

As explained above, the intent of a trajectory model is to determine potential trajectory paths and identify potential environmental resources at risk in the event of an unintended release of crude oil from the buoy or pipeline.

Two simulation releases (at two different rates) were modeled for each season. The two releases add up to the calculated volume for the worst-case discharge.. The worst-case discharge was calculated based on a very unlikely event that the subsea pipeline suffers a full-bore rupture *and* all the contents of the pipeline is evacuated.

In the Trajectory Modeling Report, each deterministic seasonal model run was analyzed to determine any potential environmental and/or socioeconomic impacts. The trajectory modeling shows what could be impacted. To determine potential impacts, an expansive data search was conducted to identify the sensitive areas in and around Corpus Christi. These areas are presented in the report. The report also has maps that illustrate the shoreline impacts relative to these areas.

The Tactical Response Plan provides specific mitigation measures to protect and limit the impacts to these areas when responding to a release. The draft Tactical Response Plan is reference and included as part of the DWPL application and shows what needs to be deployed to mitigate the impacts. The Tactical Response Plan will have maps showing precisely the location and the type of equipment to deploy for use in planning a response effort. The plan designates response sites along Corpus Christi Bay Systems and associated drainages. These response sites were identified to include the following: site access and waterway information, strategy map, and a work assignment list with required resources to be adapted to a future incident.

14.5.3 Safety & Security

The Project will comply with all applicable laws, regulations, and design standards to ensure the safe and secure construction and operation of the proposed DWP. Additionally, the following mitigation measures are proposed to be implemented to enhance the safety and security of the Project:

- The Applicant will petition the USCG to establish Safety Zones, ATBA, and NAA, per the procedures outlined in 33 CFR 150, Subpart J, and the IMO guidelines;
- The Project plans on securing dedicated support fleet, capable of deploying booms, responding to emergencies, and assisting the mooring and disconnecting of the tankers.
- The Project will finalize and implement a DWP Marine Operations Manual with specific requirements describing the manning and operation of the DWP, including operation of the SPM buoy, safety and navigation to and from the SPM buoy system by third parties, and safety and operation of the onshore project facilities; and,
- The Project will develop and implement an Emergency Response Plan, a Facility Safety & Security Plan, and any other safety or security documents and personnel guidelines deemed necessary by the project or the USCG.

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