Deepwater Port License Application
West Delta Deepwater Port LNG Export Development

Volume I – General (Public), including Deepwater Port License Application and Appendices

Submitted to:

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Deepwater Port License Application
West Delta Deepwater Port LNG Export Development

Submitted in five volumes as follows:

<u>Volume I</u>: General (Public), including Deepwater Port License Application (DPLA) and Appendices (*herein*)

<u>Volume IIa</u>: Offshore Project Components, Environmental Evaluation (Public) *(under separate cover)*

<u>Volume IIb</u>: Onshore Project Components, Environmental Evaluation (Public) *(under separate cover)*

<u>Volume III</u>: Technical Attachments (*Confidential*) *(under separate cover)*

<u>Volume IV</u>: Company and Financial Attachments (*Confidential*) *(under separate cover)*

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
AIS	automatic identification system
APE	area of potential effect
Applicant	West Delta LNG, LLC
BHGE	Baker Hughes, a GE Company
BML	below the mud line
BOE	barrels of oil equivalent
BOEM	U.S. Department of the Interior Bureau of Ocean Energy Management
BOG	boil-off gas
BP	before present
BSEE	Bureau of Safety and Environmental Enforcement
CFR	Code of Federal Regulations
CMS	CMS Oil and Gas
Cox	Cox Operating, LLC
CSW-G	Construction Stormwater - General
CTD	conductivity-temperature-depth
CUP	Coastal Use Permit
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DPLA	Deepwater Port License Application
DWP	deepwater port
DWPA	Deepwater Port Act
FSP	flat-panel, semi-membrane, prismatic-shaped
FTA	free trade agreement
Fugro	Fugro USA Marine, Inc.
HDD	horizontal directional drill
HR2D	high-resolution two-dimensional
HST-G	Hydrostatic Test Water-General
HUC	Hydrologic Unit Code
HVAC	heating, ventilation, and air conditioning

ISO	International Standardization Organization
km/h	kilometers per hour
LDEQ	Louisiana Department of Environmental Quality
LDNR	Louisiana Department of Natural Resources
LNG	liquefied natural gas
LOOP	Louisiana Offshore Oil Platform
m/s	meters per second
m^3	cubic meters
m^3/hr	cubic meters per hour
MAG	magnetometer
MARAD	U.S. Maritime Administration
MBES	multi-beam echo sounder bathymetry
MMscfd	million standard cubic feet per day
MMtpa	million metric tonnes per annum
MPa	megapascal
mph	miles per hour
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NSA	noise sensitive area
NTL	Notices to Lessees
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
OPMAN	Port Operations Manual
PIANC	World Association for Waterborne Transport Infrastructure
Project	West Delta Deepwater Port LNG Export Development; *also* West Delta LNG Project, *or* the proposed Project
psig	pounds per square inch gauge
RACON	radar transponder beacon
RV	recreational vehical
SBP	sub-bottom profiler
SCMR	single-cycle, mixed refrigerant
SSS	side-scan sonar

U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
Venice Pretreatment Plant	proposed onshore equipment and supply facilities
West Delta LNG Project	West Delta Deepwater Port LNG Export Development; *also* the Project, *or* the proposed Project
WMA	Wilderness Management Area
WQC	Water Quality Certification
WRF	Weather Research Forecasting

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PROJECT FAST FACTS

General Project Terminology	
Applicant	West Delta LNG, LLC, a Delaware limited liability company and subsidiary of LNG 21, LLC
West Delta Deepwater Port LNG Export Development Project	The overall project (offshore and onshore components); also the West Delta LNG Project
West Delta DWP	The offshore portion of the West Delta Deepwater Port LNG Export Development Project
Venice Gas Complex	An existing onshore natural gas processing plant that could supply the West Delta Deepwater Port LNG Export Development Project with feed natural gas once a contract is in place
Venice Pretreatment Plant	The Applicant's natural gas pretreatment facility (to be leased and constructed in the Venice Gas Complex) that will pretreat and send "ready-to-liquefy" natural gas to the West Delta DWP

Location and General Information	
West Delta DWP Location	10.5 nautical miles (12.1 statute miles, or 19.4 kilometers) offshore Plaquemines Parish, Louisiana
West Delta DWP Lease Block	West Delta Lease Block 44, Outer Continental Shelf, Gulf of Mexico
West Delta DWP Water Depth	Approximately 57 to 60 feet (17.4 to 18.3 meters)
Venice Gas Complex Location	Plaquemines Parish, Louisiana
Onshore Pipeline Location	Plaquemines Parish, Louisiana
Delivery Capacity	Nominal design case: 5.0 million metric tons per annum (MMtpa) Optimized case: 6.1 MMtpa

West Delta DWP Components	
Gas Arrival Platform (1 total)	▪ 4-pile fixed platform jacket structure ▪ Contains the inlet gas receiving equipment (pipeline pig receiver, metering, filter separator, mercury guard beds, etc.) ▪ Contains laydown area for International Standardization Organization (ISO) tank containers for refrigerant re-supply
LNG Production Platforms (3 total)	▪ Each supported by 2 fixed platform jackets, for a total of 6 fixed platform jackets ▪ Each platform jacket requires 7 piles per platform, for a total of 42 piles ▪ Each contains 2 air-cooled LNG liquefaction trains, for a total of 6 liquefaction trains
LNG Storage Platforms (5 total)	▪ The set of 5 platforms would be supported by 6 fixed platform jackets ▪ 4 jackets would have 12 piles each, and 2 having 10 piles each, for a total of 68 piles ▪ Each platform consists of 3 LNG storage tanks with a 20,000 cubic meter (m^3) capacity per tank, for a total of 60,000 m^3 per platform, or 300,000 m^3 total for all 5 LNG storage platforms

West Delta DWP Components	
Flare Platform (1 total)	▪ 1 tripod fixed platform structure ▪ Contains a flare system with 1 high-pressure flare, and 1 low-pressure flare
Loading Platform (1 total)	▪ 4-pile fixed platform structure ▪ Contains the LNG trading carrier loading equipment, including a loading arm system, fire monitoring and firefighting, and gangway access to the LNG trading carrier and dolphins
Accommodations Platform (1 total)	▪ 4-pile fixed platform structure ▪ Provides a 36-man accommodation package for deepwater port personnel ▪ Provides potable water and emergency power generation systems for this platform's use
Utilities Platform (1 total)	▪ 14-pile fixed platform structure supported by 2 fixed platform jackets, 7 piles each ▪ Contains common utilities (steam based power generation, boil-off gas compression, air compression, nitrogen generation, reverse osmosis system, electrical systems, control room, essential power generation, etc.)
Breasting Dolphins (4 total)	▪ Each supported by a 4-pile fixed platform structure ▪ Each contains fender equipment for LNG trading carrier berthing ▪ Provides surface trestle access to the loading platform and mooring dolphins
Mooring Dolphins (6 total)	▪ Each supported by a tripod fixed platform structure ▪ Each contains mooring equipment to moor LNG trading carriers ▪ Provides surface trestle access to the breasting dolphins
Connecting Bridges (11 total)	▪ Provide piping, electrical, instrument/automation, and personnel transit between platforms ▪ Bridge between the Accommodations and LNG Production platforms supported mid-way by a tripod support structure
Liquefaction Trains (6 total)	▪ Each consists of a single 0.83 MMtpa liquefaction unit and 1 ethane generation system ▪ Utilizes Bake Hughes, a GE Company (BHGE) single cycle mixed refrigerant (SCMR) liquefaction process
LNG Storage Tanks (15 total)	▪ Flat-panel, semi-membrane, prismatic-shaped (FSP) type B tank ▪ Each tank has a capacity of approximately 20,000 m^3 ▪ Each tank has 1 submersible cryogenic pump (in-tank) for LNG loading, along with all the associated piping and instrumentation for pressure, temperature, and level control ▪ 1 LNG storage platform has common boil-off gas handling system for all FSP tanks

Proposed Venice Pretreatment Plant Components	
Existing Cryogenic Trains (2 total)	▪ Process offshore sourced gas to extract liquefied petroleum gas products and residue natural gas ▪ 1 sized to process up to 300 MMscfd ▪ 1 sized to process up to 450 MMscfd
New Natural Gas Inlet Compressors (3 total)	▪ Driven by gas turbines (3,500 horsepower each) to deliver up to 600 MMscfd of interstate pipeline feed gas at a delivery pressure of 1,000 pounds per square inch gauge (psig) ▪ Supplements residue gas from the existing cryogenic trains

Proposed Venice Pretreatment Plant Components	
New Gas Pretreatment Packages (4 total)	▪ Each processes 200 to 300 MMscfd ▪ 2 new gas pretreatment packages, as described below, but without the heavy hydrocarbon removal unit; located upstream of the existing cryogenic trains ▪ 2 new gas pretreatment packages consist of mercury removal units, acid gas removal units to remove carbon dioxide and hydrogen sulfide with waste gas sent to flare, dehydration units, and heavy hydrocarbon removal
Pipeline Compressors (3 total)	▪ Driven by gas turbines (5,600 horsepower each) to deliver up to 900 MMscfd of "ready to liquefy" specification feed gas to the West Delta DWP at a delivery pressure of 1,000 psig
Power Generation (3 total)	▪ Gas turbine power generation units (9 megawatts each) to support the gas pretreatment packages
Waste Heat Recovery/Hot Oil Systems (3 total)	▪ Installed on the gas turbine electric generators (3) ▪ Supplemented by a direct fired heater
Utilities	▪ Installed to support the new gas pretreatment and compression equipment ▪ 1 fuel gas system of 20 MMscfd capacity ▪ 1 nitrogen generation system ▪ Compressed air equipment ▪ Demineralized water system
Flares (2 total)	▪ Existing flare for controlled hydrocarbon releases of cryogenic trains ▪ New flare for gas pretreatment packages to combust waste gas from the pretreatment process

Pipeline from the Venice Pretreatment Plant to the West Delta DWP	
Dimensions	▪ 19.8-statute-mile (31.9-kilometer) 30-inch (76.2-centimeter) diameter feed gas supply pipeline - 4.3 statute miles (6.9 kilometers) onshore in Plaquemines Parish, Louisiana (measured from the proposed pig launcher to the high water mark) - 15.5 statute miles (24.9 kilometers) offshore Louisiana in the Gulf of Mexico

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1 Introduction

1.1 Project Overview

West Delta LNG, LLC (the Applicant), a Delaware limited liability company and subsidiary of LNG 21, LLC, is proposing to construct, own, and operate a deepwater port (DWP) facility in the Gulf of Mexico to serve the global liquefied natural gas (LNG) market. The proposed DWP would be located in federal waters within the Outer Continental Shelf (OCS), approximately 10.5 nautical miles (12.1 statute miles, or 19.4 kilometers) offshore Plaquemines Parish, Louisiana, in water depths ranging from approximately 57 to 60 feet (17.4 to 18.3 meters) (Volume I, Appendix A, "Figures," Figure 1).

The primary purpose of the West Delta DWP LNG Export Development (the Project; *also* the West Delta LNG Project, *or* the proposed Project) would be to provide a safe and reliable facility to export domestically produced LNG to countries with free trade agreements (FTAs) and to countries without free trade agreements (non-FTA) with the United States of America. The Applicant is filing this Deepwater Port License Application (DPLA) for a license to construct, own, and operate the proposed DWP pursuant to the Deepwater Port Act of 1974, as amended (DWPA), and in accordance with Maritime Administration (MARAD) and U.S. Coast Guard (USCG) implementing regulations. The Applicant is in discussions with Venice Energy Service Company (VESCO) to have access to feed gas supply for the Project through the existing Venice Gas Complex, located in Plaquemines Parish, Louisiana. Under this proposal, the Applicant would sublease space within the 121-acre (49-hectare) Venice Gas Complex to install the equipment needed to pretreat and physically deliver "ready-to-liquefy" natural gas to the West Delta DWP. Once leased and constructed, the proposed equipment and supply facilities would comprise the new Venice Pretreatment Plant, which would connect to the West Delta DWP via a new pipeline (Volume I, Appendix A, "Figures," Figure 1).

The Applicant would utilize LNG trading carriers from the worldwide fleet for exporting LNG to customers around the world; however, the LNG trading carriers are not considered part of the Project. The LNG trading carriers calling on the West Delta DWP would have nominal cargo capacities between 30,000 and 180,000 cubic meters (m^3). The West Delta DWP would facilitate LNG trading carriers berthing at the proposed DWP for LNG loading. Once loaded, the LNG trading carriers would depart the DWP to transport the cargo to various export markets worldwide.

The Project would have offshore/marine components and onshore gas pretreatment and supply components, as described below.

OFFSHORE/MARINE COMPONENTS

The offshore/marine components would consist of thirteen (13) fixed bridge connected platforms and ten (10) dolphins that would serve as the following (Volume I, Appendix A, "Figures," Figure 2):

- **LNG Production and Storage**
  - Gas Arrival Platform: one (1)
  - LNG Production Platforms: three (3), with two liquefaction trains per platform
  - LNG Storage Platforms: five (5)
  - Flare Platform: one (1)
- **Loading Platform and Marine Berth Facilities**
  - LNG Loading Platform: one (1)
  - Mooring Dolphins: six (6)

  - Breasting Dolphins: four (4)
- **Support Facilities**
  - Accommodations Platform: one (1)
  - Utilities Platform: one (1)
  - Connecting Bridges among platforms: eleven (11)

The Project would utilize Baker Hughes, a GE Company (BHGE) single cycle, mixed refrigerant (SCMR) technology for six (6) liquefaction trains capable of delivering 0.83 million metric tonnes per annum (MMtpa) each, for a nominal total of 5.0 MMtpa of LNG for export. Storage facilities would consist of fifteen (15) LNG storage tanks that would hold 20,000 m3 each, providing a total storage capacity of 300,000 m3 of LNG.

In the nominal design case[1], the Venice Pretreatment Plant would process approximately 750 million standard cubic feet per day (MMscfd) of feed natural gas for the proposed DWP. Based on an estimated production unit availability of 95.4 percent and an allowance for consumption of feed gas during the liquefaction process, the proposed DWP would nominally produce 5.0 MMtpa of LNG for export. For the optimized case[2], the proposed Project would process approximately 900 MMscfd of feed natural gas to produce approximately 6.1 MMtpa of LNG for export. Accordingly, the Applicant is requesting authorization under the DWPA to own, construct, and operate facilities capable of exporting up to 6.1 MMtpa of LNG to FTA and non-FTA nations.

ONSHORE GAS PRETREATMENT AND SUPPLY COMPONENTS

The Venice Pretreatment Plant would receive natural gas from offshore Gulf of Mexico gathering systems and midstream pipelines and/or interstate pipeline feed gas from pipelines already interconnected with the Venice Gas Complex. The natural gas would be pre-treated to meet BHGE's LNG liquefaction specifications, compressed onshore, and sent via a proposed 30-inch (76.2-centimeter) diameter pipeline to the West Delta DWP (Volume I, Appendix A, "Figures," Figure 1). The Venice Pretreatment Plant would consist of the following major components for the pre-treatment and processing of sourced natural gas:

- Three (3) new natural gas inlet compressors (3x50%) to deliver up to 600 MMscfd of interstate pipeline feed gas to the Venice Pretreatment Plant at a delivery pressure of 1,000 pounds per square inch gauge (psig) (6.99 megapascals [MPa]).
- Four (4) new gas pretreatment packages, with each processing 200 to 300 MMscfd to meet "ready-to-liquefy" specifications.
- Three (3) new pipeline compressors (3x50%) to deliver up to 900 MMscfd of "ready-to-liquefy" specification feed gas to the West Delta DWP at a delivery pressure of 1,000 psig (6.99 MPa).
- Additional utilities would include power generators (3x50%) to provide 27 megawatts of electrical power (9 megawatts each) supporting the proposed gas pretreatment equipment.
- Additional equipment would include low- and high-pressure headers and a pig launcher.

[1] The estimated production capacity for the "nominal design case" composition with an inlet gas pressure of 1,000 psig (6.99 megapascals [MPa]) and an ambient temperature of 70 degrees Fahrenheit (°F) (21.1 degrees Celsius [°C]) is 5.0 MMtpa.

[2] The estimated production capacity for the "optimized case" with an inlet pressure of 1,000 psig (6.99 MPa) and an ambient temperature of 56°F (13.3°C) is 6.1 MMtpa.

Feed gas would be supplied via a proposed 30-inch (76.2-centimeter) diameter pipeline. This proposed pipeline would be approximately 19.8 statute miles (31.9 kilometers) in length, with 4.3 statute miles (6.9 kilometers) onshore in Louisiana (measured from the proposed pig launcher to the high water mark) and 15.5 statute miles (24.9 kilometers) offshore in the Gulf of Mexico.

2 §148.105(a) Applicant, Affiliate, and Consultant Information

This section provides corporate information on West Delta LNG, LLC and its affiliates, as defined by the DWPA. Further information regarding West Delta LNG, LLC and its affiliates is provided in Volume IV, "Company and Financial Attachments," (*Confidential*).

2.1 §148.105(a)(1) Identities of the Applicant, Affiliate(s), and Consultant(s)

Name of Applicant:	**West Delta LNG, LLC**
Address:	2800 North Loop West, Suite 921 Houston, Texas 77092
Telephone Number:	(713) 904-5873
Citizenship:	United States (Delaware)
Principal Business Activity:	Development of a DWP to serve the LNG export market
Affiliate of Applicant:	**LNG 21, LLC (Parent Company)**
Address:	2800 North Loop West, Suite 921 Houston, Texas 77092
Telephone Number:	(713) 904-5873
Citizenship:	United States (Delaware)
Principal Business Activity:	LNG projects and related activities
Affiliate of Applicant:	**Cox Investment Partners, L.P.***
Address:	4514 Cole Ave, Suite 1175 Dallas, Texas 75205
Telephone Number:	(214) 420-7710
Citizenship:	United States (Delaware)
Principal Business Activity:	LNG project development and ownership
Affiliate of Applicant:	**JPA Group, LLC***
Address:	2800 North Loop West, Suite 921 Houston, Texas 77092
Telephone Number:	(713) 904-5873
Citizenship:	United States (Texas)
Principal Business Activity:	LNG project development and ownership

Affiliate of Applicant:	**Quest LNG Partners, LLC***
Address:	2800 North Loop West, Suite 921 Houston, Texas 77092
Telephone Number:	(713) 904-5873
Citizenship:	United States (Texas)
Principal Business Activity:	LNG project development and ownership
Affiliate of Applicant:	Deepwater Energy Partners, LLC*
Address:	2800 North Loop West, Suite 900 Houston, Texas 77092
Telephone Number:	(713) 820-9601
Citizenship:	United States (Delaware)
Principal Business Activity:	LNG project development and related activities

*Note: These private investors are direct shareholders of LNG 21, LLC, West Delta LNG, LLC's corporate parent, as described further below.

Additional information regarding West Delta LNG, LLC and its affiliates, including information regarding private shareholders with an indirect ownership interest in the West Delta LNG Project, is provided in Volume IV, Section 2 (*Confidential*) of this application. Information on engineering and consulting firms presently working on the West Delta LNG Project is provided in Section 4, "§148.105(c) Engineering Firms," below.

2.2 §148.105(a)(2) Identities of Applicant's Subsidiaries and Divisions

West Delta LNG, LLC and parent company, LNG 21, LLC, participated in the decision to apply for a license to construct, own, and operate the West Delta LNG Project. Contact information, including the names, addresses, and principal business activities of these participants, is listed in Section 2.1, "§148.105(a)(1) Identities of the Applicant, Affiliate(s), and Consultant(s)," above.

2.3 §148.105(a)(3) Affiliate Relationship(s) to Applicant

West Delta LNG, LLC is a Delaware limited liability company established to own, construct, and operate the proposed West Delta DWP. West Delta LNG, LLC is a wholly-owned subsidiary of LNG 21, LLC. LNG 21, LLC, is a Delaware limited liability company involved in the development of LNG projects and related activities.

A description of each affiliate, as defined by 33 Code of Federal Regulations (CFR) 148.5, and its respective ownership interest in West Delta LNG, LLC is provided in Volume IV, Section 2 (*Confidential*).

2.4 §148.105(a)(4) Corporate Officers and Directors and Certain Affiliates

As described in Section 2.2, "§148.105(a)(2) Identities of Applicant's Subsidiaries and Divisions," above, West Delta LNG, LLC and its parent company, LNG 21, LLC, participated in the decision to apply

for a license to construct, own, and operate the West Delta LNG Project. Table 2-1 provides the names and titles of the officers of West Delta LNG, LLC. Table 2-2 provides the names of the directors and managers of LNG 21, LLC.

Table 2-1
Corporate Officers of West Delta LNG, LLC (Applicant)

Title	Name
Chief Executive Officer	John D. Schiller
Chief Operating Officer	Peter B. Mercure
Chief Financial Officer	Anthony Socci
Chief Administrative Officer	Erik Saenz

Table 2-2
Corporate Officers and Mangers of LNG 21, LLC (Affiliate)

Title	Name
Chief Executive Officer, Manager	John D. Schiller
Chief Operating Officer	Peter B. Mercure
Chief Financial Officer	Anthony Socci
Chief Administrative Officer, Manager	Erik Saenz
Manager	Albert Pope
Manager	Craig L. Sanders

2.5 *§148.105(a)(5)* Applicant's and Affiliates' Five-Year Histories

Neither West Delta LNG, LLC nor any of its affiliates have been subject to any civil or criminal legal proceedings during the preceding 5 years that relate to, or could materially affect, information in this DPLA.

2.6 *§148.105(a)(6)* Lobbying Activities, 31 U.S.C. 1352

Neither West Delta LNG, LLC nor any of its affiliates have engaged in any lobbying activities that are prohibited by 31 United States Code (U.S.C.) 1352 or any other applicable federal anti-lobbying statute.

3 §148.105(b) Experience Related to Deepwater Ports

This section provides an overview of West Delta LNG, LLC's affiliates' and contractor's experience related to the matters addressed by 33 CFR 148.105(b).

3.1 §148.105(b)(1) Offshore Operations Experience

LNG 21, LLC Corporate Management

John D. Schiller joined LNG 21, LLC in 2018 as Chief Executive Officer. He is an industry veteran, having served in the upstream oil and gas development for nearly 40 years. Mr. Schiller graduated in 1981 from Texas A&M University with a BS degree with honors in Petroleum Engineering. He started his career with Superior Oil and has gone on to hold senior leadership positions with Seagull and Ocean. With Devon Energy, he was Vice President over Exploration and Production, overseeing worldwide exploration, production, and drilling activities. After Devon Energy, Mr. Schiller started Energy XXI in 2005, serving as the company's Chairman of the Board, Chief Executive Officer, and President. Mr. Schiller led the initial public offering of Energy XXI and oversaw production growth to 65,000 barrels of oil equivalent per day from the Gulf of Mexico and the Louisiana Gulf coast. He resigned from Energy XXI in 2017. Mr. Schiller was inducted into the Texas A&M University Harold Vance Department of Petroleum Engineering's Academy of Distinguished Graduates in 2008 and was named the 2014 Ernst & Young Entrepreneur of the Year.

Peter B. Mercure joined LNG 21, LLC in early 2018 as Chief Operating Officer. He holds a BS in Petroleum Engineering from Texas A&M University (1998) and a Masters from the University of Southern California (2005). Mr. Mercure has held various upstream engineering positions with Atlantic Richfield, Unocal, and Occidental Petroleum across a multitude of domestic and international producing assets. In 2008, Mr. Mercure left the upstream development market and started a California-based energy services company, which focused on niche high-temperature technology and service applications for oil, gas, and geothermal energy developments across the United States, Central America, and Southeast Asia. The company was sold to National Petroleum Services (Dubai) in 2017.

Cox Operating, LLC (Strategic Partner)

Cox Operating, LLC (Cox) is a privately held entity that owns and operates assets in the Gulf of Mexico and was founded by fourth generation oilman, Brad E. Cox.[3] Cox is based in Dallas, Texas, with operation staff in New Orleans, Louisiana, and Houston, Texas. Cox has grown through enhanced development of production and reserves in existing assets along with strategic acquisitions. Since its formation in 2004, Cox has compiled an extensive portfolio of assets in the Gulf of Mexico. The company currently operates more than 600 producing wells from approximately 500 structures over 66 fields with daily production of approximately 85,000 barrels of oil equivalent. The operations currently stretch from Texas to Florida, with structures ranging from the shallow waters in the state of Louisiana to approximately 400 feet (122 meters) of water on the OCS. The company has assembled an experienced management team

[3] For further information see https://coxoperating.com/.

supported by an array of seasoned geotechnical experts. Cox strives to have full employment of field personnel, as opposed to outside contractors, to operate the assets in the portfolio.

Today, Cox has an ongoing development program to identify opportunities in existing wells in addition to new plays and prospects. The company's experienced internal personnel possess the ability to identify as well as efficiently execute new opportunities, and field personnel strive to maintain safety and compliance as their foremost task above economic gain. This mentality and ethic has helped establish a record that continues to be one of the top in the industry.

Rodney Dykes joined Cox in November 2010 as Chief Operating Officer, having most recently served as an independent consultant to several offshore and onshore operators. Mr. Dykes has over 33 years of experience in all phases of oil and gas exploration and development in both technical and managerial capacities. In the international oil and gas industry, his experience stretches over West Africa, Southeast Asia, and South America, and includes jobs as Project Manager for Maxus Energy Corporation in Ecuador, where he managed more than 1,500 people as part of a $1 billion project. He also served as International Drilling Manager at Maxus with responsibility for exploration and development operations in Bolivia and Colombia. Mr. Dykes also worked with CMS Oil and Gas (CMS) to establish an international operating staff. He also was responsible for performing due diligence with respect to the acquisition of Walter International, Inc., and, following the acquisition, assumed responsibility for three international projects in the Congo, Equatorial Guinea, and Tunisia, in CMS's first-ever role as an international operator.

3.2 *§148.105(b)(2)* Contracted Affiliates' Marine and Offshore Construction Experience and Qualifications

West Delta LNG, LLC has not, at the time of submitting this DPLA, entered into any contract for the construction of the West Delta DWP. When or if such contracts are executed, West Delta LNG, LLC will provide copies to MARAD and the USCG.

4 §148.105(c) Engineering Firms

Table 4-1 summarizes the identities and contact information of each engineering firm currently involved in developing the technical details supporting the offshore portions of the DPLA. The project experience for each firm is summarized in Volume III, Attachment 1, "Identity of Engineering Firms," (*Confidential*) of this application. Additional engineering firms may be identified as the detailed design of the Project progresses. In such instances, West Delta LNG, LLC will provide notification to the USCG as additional engineering firms are contracted. A list of preparers for the DPLA is provided in Volume IIa, Section 13, "List of Preparers for the Deepwater Port License Application," for offshore Project components and Volume IIb, Section 9, "List of Preparers for the Deepwater Port License Application," for onshore Project components.

Table 4-1
Identity of Participating Engineering Firms and Contact Information

Company Name	Address	Citizenship	Telephone Number
Ecology and Environment, Inc.	1792 Bell Tower Lane, Suite 204 Weston, Florida 33326 United States	USA	(954) 315-3654 Ext. 1033
Wood Group USA, Inc.	17325 Park Row Houston, Texas 77084 United States	USA	(832) 809-8000
Braemar Technical Services	2800 North Loop West, Suite 921 Houston, Texas 77092 United States	USA	(713) 688-5353
Risknology, Inc.	3218 Quiet Lake Drive Katy, Texas 77450 United States	USA	(713) 504-3043
Fugro USA Marine, Inc.	6100 Hillcroft Avenue Houston, Texas 77081 United States	USA	(713) 369-5600
CSA Ocean Sciences, Inc.	8502 SW Kansas Avenue Stuart, Florida 34997 United States	USA	(772) 219-3023
Moffatt & Nichol	1780 Hughes Landing Boulevard, Suite 575 The Woodlands, Texas 77380 United States	USA	(713) 977-7372
RTP Environmental Associates, Inc.	304A West Millbrook Road Raleigh, North Carolina 27619 United States	USA	(919) 845-1422

Note: See Volume III, Attachment 1, "Identity of Engineering Firms," (*Confidential*) for each firm's qualifications.

5 *§148.105(d)* Applicant's Citizenship and Operating Authority

West Delta LNG, LLC is a limited liability company organized under the laws of the State of Delaware. West Delta LNG, LLC and all of its officers are U.S. citizens. LNG 21, LLC, the parent company and sole member of West Delta LNG, LLC, is a limited liability company organized under the laws of the State of Delaware. Individual and company affidavits attesting thereto are provided in Volume IV, Attachment A.3 (*Confidential*) of this DPLA. Legal documents pertaining to the formation of West Delta LNG, LLC are provided in Volume IV, Attachments A.1 and A.2 (*Confidential*).

6 §148.105(e) Address for Service of Documents

General Contact for Service of Documents:

Peter Mercure
Chief Operating Officer
West Delta LNG, LLC
2800 North Loop West, Suite 921
Houston, Texas 77092
pmercure@lng21group.com
(713) 904-5872

Additional Contact Information:

Environmental

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Principal Engineer/Project Manager
Ecology and Environment, Inc.
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Larry J Cutburth
Project Manager – Offshore / Onshore
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(202) 637-6470

7 §148.105(f) Proposed Location and Use of Deepwater Port

7.1 West Delta DWP Location

Table 7-1 presents the proposed centroid location information for each West Delta DWP component that would be fixed to the seafloor for the life of the West Delta LNG Project. This includes the DWP components discussed in Section 1.1, "Project Overview," above. The West Delta LNG Project has been designed for a 30-year life.

Table 7-1
Platform / Structure Centroid Information for the West Delta Deepwater Port

Platform	Easting (UTM U.S. Survey Feet)	Northing (UTM U.S. Survey Feet)	Latitude (degrees minutes seconds)	Longitude (degrees minutes seconds)
Gas Arrival Platform	792,692.82	10,564,313.02	29° 04' 56.11" N	89° 39' 16.00" W
LNG Production Platform 1	792,314.46	10,564,224.52	29° 04' 55.15" N	89° 39' 20.23" W
LNG Production Platform 2	792,326.91	10,564,559.15	29° 04' 58.46" N	89° 39' 20.18" W
LNG Production Platform 3	792,339.35	10,564,893.77	29° 05' 01.77" N	89° 39' 20.12" W
LNG Storage Platform 1	792,632.86	10,563,708.26	29° 04' 50.11" N	89° 39' 16.52" W
LNG Storage Platform 2	792,841.12	10,563,700.48	29° 04' 50.08" N	89° 39' 14.17" W
LNG Storage Platform 3	793,049.39	10,563,692.70	29° 04' 50.05" N	89° 39' 11.82" W
LNG Storage Platform 4	793,257.66	10,563,684.93	29° 04' 50.02" N	89° 39' 09.47" W
LNG Storage Platform 5	793,465.92	10,563,677.15	29° 04' 49.99" N	89° 39' 07.13" W
LNG Loading Platform	792,132.34	10,563,555.90	29° 04' 48.49" N	89° 39' 22.12" W
Flare Platform	792,696.28	10,564,679.85	29° 04' 59.74" N	89° 39' 16.05" W
Utilities Platform	792,244.38	10,563,854.34	29° 04' 51.47" N	89° 39' 20.93" W
Accommodations Platform	791,833.53	10,564,379.49	29° 04' 56.57" N	89° 39' 25.69" W
Bridge Support Tripod	792,026.62	10,564,371.61	29° 04' 56.54" N	89° 39' 23.51" W
Breasting Dolphin 1	791,998.71	10,563,670.78	29° 04' 49.60" N	89° 39' 23.65" W
Breasting Dolphin 2	792,046.36	10,563,619.44	29° 04' 49.10" N	89° 39' 23.10" W
Breasting Dolphin 3	792,189.29	10,563,465.42	29° 04' 47.61" N	89° 39' 21.45" W
Breasting Dolphin 4	792,236.93	10,563,414.07	29° 04' 47.11" N	89° 39' 20.90" W
Mooring Dolphin 1	791,819.11	10,564,029.67	29° 04' 53.11" N	89° 39' 25.76" W
Mooring Dolphin 2	791,897.39	10,563,945.32	29° 04' 52.29" N	89° 39' 24.86" W
Mooring Dolphin 3	791,996.04	10,563,839.01	29° 04' 51.26" N	89° 39' 23.72" W
Mooring Dolphin 4	792,404.45	10,563,398.89	29° 04' 47.00" N	89° 39' 19.01" W
Mooring Dolphin 5	792,503.11	10,563,292.58	29° 04' 45.97" N	89° 39' 17.87" W
Mooring Dolphin 6	792,581.39	10,563,208.22	29° 04' 45.15" N	89° 39' 16.97" W

Source: UTM Zone 16, Datum NAD83 (2011)Key:
LNG = liquefied natural gas
UTM = Universal Transverse Mercator

7.2 Subsea Pipelines from Onshore to the West Delta DWP

The proposed offshore pipeline would leave the Plaquemines Parish, Louisiana, shoreline and generally continue southwest toward the proposed West Delta DWP site. The proposed offshore pipeline would cross eight OCS lease blocks, all within the West Delta Protraction Area. Table 7-2 lists the lease blocks traversed by the proposed offshore pipeline route associated with the West Delta LNG Project. See Figure 1 in Volume I, Appendix A, "Figures," as well as Volume IIa, Appendix A, "Subsea Pipeline Charts," for the location of the pipeline.

Table 7-2
West Delta Protraction Area Lease Blocks Traversed by the West Delta Deepwater Port Offshore Pipeline

24	26	27
28	47	46
45	44	

Source: BOEM 2015[4]

7.3 Deepwater Port Use

The West Delta DWP would receive LNG trading carriers with nominal capacities between 30,000 m^3 and up to 180,000 m^3. The DWP would allow LNG trading carriers to berth either "port to" or "starboard to." There would be two suggested navigation routes for approach and departure of LNG trading carriers to and from the DWP. These navigation routes may be utilized for approach, departure, or both, per the discretion of the LNG trading carrier master, mooring/loading master, and sea states. In the event that an arriving LNG trading carrier would need to wait near the DWP until the berth is clear, an anchorage area approximately 3,000 feet (914 meters) in diameter would be designated within the southwestern portion of West Delta Lease Block 44. The final anchorage area chosen would be clear of pipelines or obstructions and navigation routes and of sufficient water depth. This area would also be clear of arriving or departing LNG trading carriers and any ongoing DWP marine operations.

The West Delta DWP safety zone would be a circular area measuring 2.25 nautical miles (2.58 statute miles, or 4.17 kilometers) in diameter and would encompass the DWP and the tug mooring area. This safety zone would provide LNG trading carriers and tug boats with sufficient room for safe maneuvering and alignment with the right approach angle to the loading platform berth. Only vessels associated with the DWP would be allowed to enter the safety zone. Bunkering or resupply of LNG trading carriers would not be allowed at the DWP. The DWP safety zone would be shown on navigation charts but not marked with any perimeter buoys or other navigation aids. The area to be avoided would be a circular area of approximately 3.0 nautical miles (3.5 statute miles, or 5.6 kilometers). This area would include the safety zone plus an additional area beyond the safety zone, including the proposed LNG trading carrier anchorage area within West Delta Lease Block 44.

With regard to access, the West Delta DWP is proposed as a tolling export terminal through which natural gas would be liquefied for a customer and transferred to an LNG trading carrier for export to the destination port. In a typical transaction with customers for the proposed DWP, West Delta LNG, LLC would not exercise ownership of the natural gas, would not be responsible for obtaining the gas supply, and

[4] Bureau of Ocean Energy Management (BOEM). 2015. Shapefile for Table 7-2. Blocks. https://www.data.boem.gov/Main/Mapping.aspx. Accessed October 10, 2017.

would provide liquefaction, LNG storage, and export services and facilities on a contract basis to its customers. Alternatively, depending on the terms of final offtake agreements with customers, the West Delta DWP could operate on a delivery model, in which West Delta LNG, LLC or its parent LNG 21, LLC, would obtain the gas from the interstate pipeline network, transport it to the DWP, and either transfer custody at the DWP as it is loaded onto LNG trading carriers or deliver it to a potential customer's final destination.

8 §148.105(g) Financial Information

This section provides updated financial information regarding West Delta LNG, LLC and its affiliates. A more detailed description of the Applicant's financial plan is provided in Volume IV, Attachment B.1 (*Confidential*) of this DPLA.

8.1 §148.105(g)(1) Applicant and Affiliates' Financial Information

To the extent they are maintained in the normal course of business, annual financial statements and interim income statements and/or balance sheets for the previous 3 years (2016, 2017, 2018) and, if available, for first quarter (Q1) 2019, are provided in Volume IV, Attachment B.2 (*Confidential*) for West Delta LNG, LLC's affiliates with an ownership interest of greater than 3 percent. The remaining affiliates, for whom no financial statements are included, do not, in the normal course of business, produce such audited financial statements. West Delta LNG, LLC's financial statements are provided in Volume IV, Attachment B.2 (*Confidential*).

8.2 §148.105(g)(2) Construction Cost Estimates

Estimated construction costs and completion dates for the West Delta DWP are provided in Volume III, Attachment 23, "Project Development Cost Estimate," (*Confidential*), as well as in Volume IV, Attachments B.1 (in summary) and B.3 (in detail) (*Confidential*). A preliminary estimate of the cost of decommissioning all DWP marine components is provided in Volume III, Attachment 23, as well as in Volume IV, Attachments B.1 (in summary) and B.3 (in detail) (*Confidential*).

8.3 §148.105(g)(3) Future Projections

Annualized projections for the first 5 years of operation of the West Delta DWP, along with projections at intervals throughout the life of the DWP and projected financial statements, are provided in Volume IV, Attachment B.1 (in summary) and B.4 (in detail) (*Confidential*).

8.4 §148.105(g)(4) Proposals and Agreements

Copies of all proposals or agreements (if any) concerning the management and financing of the West Delta DWP available at the time of submittal of this application are provided in Volume IV, Attachment B.5 (*Confidential*). Also provided in Volume IV, Attachment B.5 (*Confidential*) are proposals and agreements (if any) with potential customers with whom West Delta LNG, LLC is in the process of negotiating contracts. MARAD and the USCG will be notified of additional proposals and agreements as they become final.

8.5 §148.105(g)(5) Throughput Reports

As the West Delta DWP is a proposed new facility and is not yet in operation, there are no throughput reports for the year preceding the application for the DWP license. Additional information on projected LNG throughput estimates is provided in Volume IV, Attachment B.1 (*Confidential*).

9 §148.105(h) Construction Contracts and Studies

West Delta LNG, LLC has not, at the time of submitting this DPLA, entered into any contract for the construction of the West Delta DWP. When such contracts are executed, West Delta LNG, LLC will forward copies to the USCG and MARAD.

9.1 §148.105(h)(2) Studies

Construction-related studies that have been prepared for the West Delta LNG Project include archaeological, geotechnical, and hazards assessments. These studies are provided in Volumes IIa and III, for offshore components, and Volume IIb for onshore components, as listed below. West Delta LNG, LLC will provide the USCG and MARAD with copies of all contracts in regard to any future studies to be undertaken that are responsive to 33 CFR 148.105(h)(2).

Offshore Surveys:

- Volume III, Attachment 2, "Shallow Hazards and Archaeological Assessment Surveys for the Deepwater Port," (*Confidential*);
- Volume III, Attachment 3, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," (*Confidential*);
- Volume III, Attachment 4, "Geotechnical Investigation Factual Field Report," (*Confidential*);
- Volume IIa, Appendix H, "Water and Sediment Sampling Report;"
- Volume IIa, Appendix J, "Baseline Underwater Noise Survey and Modeling;" and
- Geotechnical Investigation for the Proposed Pipeline [Note: *A geotechnical survey of the offshore pipeline is scheduled to be completed by the end of Q2 2020, and the Applicant anticipates filing it with USCG and MARAD post-filing in Q3 2020 as Volume III, Attachment 5, "Geotechnical Investigation for the Proposed Pipeline," (Confidential)*].

Onshore Surveys:

- Volume IIb, Appendix G, "Wetland Delineation Report;"
- Volume IIb, Appendix H, "Threatened and Endangered Species Survey Report;" and
- Geophysical, Archaeological, and Hazard Survey for the Proposed Pipeline [Note: *Ongoing at the time of filing, to be provided post-filing of the DPLA in Q4 2019; however, a draft report is included as Volume III, Attachment 3b, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," (Confidential)*].

9.2 §148.105(h)(3) Contractor Identities

Each offshore component contractor currently working on the West Delta LNG Project is identified in Section 4, "§148.105(c) Engineering Firms," above, and a summary of their experience is provided in Volume III, Attachment 1, "Identity of Engineering Firms," (*Confidential*). West Delta LNG, LLC may execute contracts for the construction of portions of the West Delta LNG Project with these or other similarly qualified contractors. When such contracts are executed, West Delta LNG, LLC will provide copies to the USCG and MARAD.

10 §148.105(i) Compliance with Federal Water Pollution Requirements

The West Delta DWP would involve activities requiring permits to ensure compliance with federal water pollution regulations. Permitted activities would include construction and operations within ocean waters of the United States that are under federal jurisdiction.

The U.S. Army Corps of Engineers (USACE) permit authority derives from Section 10 of the U.S. Rivers and Harbors Act of 1899, Section 404 of the Clean Water Act (CWA), and the Outer Continental Shelf Lands Act. These acts give the USACE jurisdiction over waters of the United States. The proposed West Delta LNG Project area is under the jurisdiction of the USACE New Orleans District. USACE specialists evaluate requests for permits for construction work in, on, or over navigable waters, and for disposal of dredged materials. Section 10 regulates navigable state and federal waters, and a permit is required for any constructed structure; thus, a Section 10 permit (an Individual Permit) is required for installation of DWP components. Section 404 regulates any disturbance from a project's construction to substrate within waters of the United States; the Section 404 permit applies to activities that may impact waters of the United States., including water bottoms and wetlands (33 CFR 323). A single USACE permit, which covers both statutory authorities—Section 10 of the Rivers and Harbors Act and Section 404 of the CWA—is required for the West Delta LNG Project.

Additionally, the federal Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.) grants the states authority to determine if activities proposed by government or private entities are consistent with the coastal management program adopted by the states. A Coastal Use Permit (CUP) application will be submitted to the Louisiana Department of Natural Resources Office of Coastal Management Permits/Mitigation Division for the onshore Project components.

Section 401 of the CWA, Water Quality Certification (WQC), provides states with the responsibility to protect water quality by requiring them to address the aquatic resource impacts of federally issued permits and licenses. Under Section 401, a federal agency cannot issue a permit or license for an activity that may result in a discharge to waters of the United States until the state from which the discharge would originate has granted or waived a WQC. In discharges outside state waters, the U.S. Environmental Protection Agency (USEPA) grants the Section 401 WQC. As part of the Joint CUP/USACE application, the Louisiana Department of Natural Resources Office of Coastal Management will coordinate with the Louisiana Department of Environmental Quality (LDEQ) Water Quality Division and provide required information for the evaluation of the Section 401 Water Quality Certification. An unsigned, draft copy of the Joint CUP/USACE permit application that would be submitted for the West Delta LNG Project is included in Volume I, Appendix B, "U.S. Army Corps of Engineers/Louisiana Department of Natural Resources Joint Permit Application for Work within the Coastal Zone").

For potential discharges within state waters resulting from onshore component construction activities, West Delta LNG, LLC will file Notices of Intent with the LDEQ for use of the Louisiana Pollutant Discharge Elimination System Hydrostatic Test Water-General (HST-G) Discharge Permit and the Construction Stormwater - General (CSW-G) Discharge Permit. West Delta LNG, LLC would be required to follow the monitoring and reporting requirements of the HST-G permit and would develop and implement a site-specific Stormwater Pollution Prevention Plan for the Venice Pretreatment Plant facilities, as required by the CSW-G Discharge Permit.

For discharges outside state waters, the water quality certification required by Section 401 of the CWA would be obtained from the USEPA. These include both construction and ongoing operational discharges to the waters above the OCS. The operational water discharges from the West Delta DWP are proposed to occur on the OCS. These discharges would be the subject of a National Pollutant Discharge Elimination System (NPDES) permit application submitted to USEPA Region 6 in Dallas, Texas (see Volume I, Appendix C, "U.S. Environmental Protection Agency National Pollutant Discharge Elimination System Permit Application"). The unsigned NPDES permit application includes the estimated volumes and characteristics of the proposed discharges.

11 §148.105(j) Coastal Zone Management

Natural gas would be transported from the Venice Pretreatment Plant located in Plaquemines Parish, Louisiana, through a newly constructed pipeline to the West Delta DWP, located approximately 10.5 nautical miles (12.1 statute miles, or 19.4 kilometers) off the coast of Plaquemines Parish, Louisiana, in water depths ranging from approximately 57 to 60 feet (17.4 to 18.3 meters).

The State of Louisiana qualifies as an adjacent coastal state for the West Delta LNG Project in accordance with the DWPA (33 U.S.C. 1502). No other state meets the definition in 33 U.S.C. 1502 of an adjacent coastal state or appears eligible for that designation by the Administrator of MARAD as an adjacent coastal state in accordance with Section 33 U.S.C. 1508 (a)(2). West Delta LNG, LLC will submit a copy of this application to the following agency for consistency review:

Louisiana Department of Natural Resources
Office of Coastal Management, Interagency Affairs & Field Services Division
617 North 3rd Street, Suite 1048, Baton Rouge, Louisiana 70802
(mail: P.O. Box 44487)
Baton Rouge, Louisiana 70804-4487
Attention: Mr. Ontario James, OCM Analyst

West Delta LNG, LLC has submitted a federal consistency certification that describes the Project's compliance with the enforceable policies of the Coastal Management Plans of Louisiana, which certified that the Project would be conducted in a manner consistent with the program. Once the Coastal Management Plan officials have reviewed the federal consistency certification and the necessary data and information pursuant to 15 CFR 930.58, they have up to 180 days to concur with or object to the consistency certification. An application for consistency certifications for Louisiana is included in Volume I, Appendix B, "U.S. Army Corps of Engineers/Louisiana Department of Natural Resources Joint Permit Application for Work within the Coastal Zone."

Additional information on Louisiana's coastal uses and resources is provided in Volume IIa, Section 10, "Coastal Zone, Recreation, and Aesthetics," and Volume IIb, Section 7, "Land Use, Coastal Zone Use, Recreation, and Aesthetics."

12 §148.105(k) Lease Block Information

12.1 §148.105(k)(1) Lease Block(s) where Proposed Deepwater Port or its Approaches are Located

The lease blocks where parts of the proposed West Delta DWP would be located are listed in Table 12-1 and illustrated in Figure 1 in Appendix A, "Figures," as well as Figure 1, Volume IIa, Appendix A, "Subsea Pipeline Charts." The proposed DWP would be located in federal waters within the OCS West Delta Area, Gulf of Mexico, approximately 10.5 nautical miles (12.1 statute miles, or 19.4 kilometers) off the coast of Plaquemines Parish, Louisiana, in water depths ranging from approximately 57 to 60 feet (17.4 to 18.3 meters). The DWP would consist of 13 platforms supported by jackets and/or piles and connected by bridges.

Table 12-1
Lease Block Information

Description	OCS Area	OCS Lease Block(s)
Proposed 30-inch Subsea Gas Interconnect Pipeline	West Delta Protraction Area	24, 26, 27, 28, 47, 46, 45, 44
Proposed Deepwater Port		44
Tug/Support Vessel Mooring Buoys		44
Anchorage Area		44

Key:
OCS = Outer Continental Shelf

12.2 §148.105(k)(2) Interest in Lease Block(s)

An initial assessment indicates that there are three lease blocks (27, 28, and 47) with active leases along the proposed subsea interconnect pipeline (Volume I, Appendix A, "Figures," Figure 4). None of the other lease blocks traversed by components of the proposed West Delta DWP have active leases (see Table 12-1 for lease block numbers). LNG trading carriers may approach the proposed DWP from either the Louisiana Offshore Oil Platform (LOOP) safety zone, anchorage area, and shipping fairway or the Southwest Pass to Gulf shipping fairway. Table 12-2 details the lease blocks the LNG trading carriers may traverse that are considered to have active leases.

Table 12-2
Active Lease Blocks Potentially Traversed by Liquefied Natural Gas Trading Carriers

LNG Trading Carrier Route	OCS Area	Active OCS Lease Blocks Crossed
LOOP Safety Zone, Anchorage Area, and Shipping Fairway	West Delta Protraction Area	75, 74, 73, 72, 93, 94, 99
	West Delta Protraction Area, South Addition	118
Southwest Pass to Gulf	West Delta Protraction Area	61, 105

Key:
LNG = liquefied natural gas
LOOP = Louisiana Offshore Oil Platform
OCS = Outer Continental Shelf

12.3 *§148.105(k)(3)* Present and Planned Use of Lease Block(s)

Numerous active pipelines lie within 10 statute miles (8.7 nautical miles, or 16.1 kilometers) of the proposed West Delta DWP, particularly to the north (Volume I, Appendix A, "Figures," Figure 4). One east-west pipeline crosses West Delta Lease Block 44. Additionally, one subsea cable is also located in the northwest quadrant of West Delta Lease Block 44.[5] The proposed subsea interconnect pipeline would cross four existing, submerged pipelines that are currently active.

To West Delta LNG, LLC's knowledge, there are three active leases in the West Delta DWP area (West Delta Protraction Area: lease blocks 27, 28, and 47), and no other currently planned uses in the area would affect the lease blocks identified in Table 12-1 (Volume I, Appendix A, "Figures," Figure 4).

[5] Bureau of Ocean Energy Management (BOEM) and National Oceanic and Atmospheric Administration (NOAA). 2016. Marine Cadstre.gov. https://marinecadastre.gov/nationalviewer/. [Layers: "Submarine Cables," "Selected Pipelines," "Outer Continental Shelf Lease Blocks"]. Accessed June 11, 2019.

13 §148.105(l) Overall Site Plan

The overall site plan of the proposed West Delta DWP is shown in Figure 2 in Volume I, Appendix A, "Figures." Each component is summarily described in the paragraphs below and in further detail in Section 14, "§148.105(m) Site Plan for Marine Components," below.

13.1 §148.105(l)(1) Floating Structures

No floating structures are anticipated as a part of the proposed West Delta DWP and, as such, none are included in the DPLA. The LNG trading carriers that would call on the West Delta DWP to load LNG are not considered Project components but are discussed throughout the section and within Volume IIa, Section 1, "Project Description, and Purpose and Need."

13.2 §148.105(l)(2) Fixed Structures

13.2.1 Subsea Pipelines

Section 7.2, "Subsea Pipelines from Onshore to the West Delta DWP," above, provides the site plan for the subsea pipeline, and Figure 1 in Volume I, Appendix A, "Figures," illustrates the location of the pipeline.

13.2.2 West Delta Deepwater Port

The proposed offshore pipeline would terminate at the West Delta DWP in West Delta Lease Block 44 offshore Plaquemines Parish, Louisiana. The DWP would consist of 13 platforms supported by jackets and piles and connected by bridges. A jacket is the structure that supports all the topsides and equipment on each DWP platform. The jacket would be anchored to the seafloor via piles that would be driven into the seafloor to a stipulated design depth. Each pile would be installed using a pile hammer/driver off a derrick barge. Each platform would consist of one (1) or more open grating decks with structures and equipment installed on various decks. Personnel accommodations would be provided on a platform separated from the LNG production, storage, and loading platforms. A total of 176 piles would be installed for the DWP. Eleven (11) bridges would connect the platforms and marine berth and provide for piping, electrical, instrument/automation, and personnel transit between platforms.

The following figures included in Volume I, Appendix A, "Figures," provide illustrations and details for each of the deck components for the West Delta DWP, which are further described in the subsequent subsections:

- Figure 5: Gas Arrival Platform Layout and Elevation View
- Figure 6: LNG Production Platforms Layout View Main Deck
- Figure 7: LNG Production Platforms Mezzanine Deck
- Figure 8: LNG Production Platforms Elevation View
- Figure 9: LNG Storage Platform Layout Main Deck
- Figure 10: LNG Storage Platform Elevation View
- Figure 11: Flare Platform Layout and Elevation View

- Figure 12: LNG Loading Platform Layout and Elevation View
- Figure 13: Accommodations Platform Layout and Elevation View
- Figure 14: Utilities Platform Layout Main Deck
- Figure 15: Utilities Platform Layout Cellar Deck
- Figure 16: Utilities Platform Elevation View

13.2.2.1 LNG Production and Storage

Gas Arrival Platform

Liquefaction-ready gas would be supplied by the Venice Pretreatment Plant and a proposed 30-inch subsea pipeline that would terminate at the gas arrival platform. The liquefaction-ready gas subsea pipeline would terminate at the bottom of the pipeline riser on the gas arrival platform. Electric supply to the platform would be provided through the electrical distribution system from the utilities platform. There would be no buildings on either deck of the gas arrival platform. The platform would be supported by a four (4) pile fixed platform jacket structure.

LNG Production Platform

There would be three (3) LNG production platforms capable of accommodating a total of six (6) liquefaction trains (two [2] trains per platform), with each liquefaction train system consisting of one (1) 0.83-MMtpa liquefaction unit and one (1) ethane extraction system. LNG production equipment would be located on the main deck. While there would be no structures on any of the decks because the LNG production equipment would occupy the available space on the decks, the mezzanine deck would contain the air coolers and condensers and once-through steam generator equipment. Each LNG production platform would be supported by two (2) fixed jacketed platforms supported by 14 piles, for a total of 42 piles for all three (3) LNG production platforms.

Liquefaction-ready gas would be transported via a proposed 30-inch subsea pipeline that would terminate at the bottom of the pipeline riser on the gas arrival platform for distribution to each of the liquefaction trains. Make-up MR components would enter a local MR header and be distributed to each liquefaction train, as needed.

LNG Storage Platforms

The West Delta DWP would have five (5) LNG storage platforms supported by six (6) platform jackets, four (4) jackets with 12 piles each, and two (2) jackets with 10 piles each, for a total of 68 piles. The storage concept is based on an International Maritime Organization Type B flat-panel, semi-membrane, prismatic-shaped (FSP) storage tank design. Each of the five (5) separate LNG storage platforms would be outfitted with three (3) 20,000 m^3 FSP storage tanks providing 60,000 m^3 of LNG per storage platform for a total DWP storage capacity of 300,000 m^3. Normal storage temperature would be -260 degrees Fahrenheit (°F) (-162 degrees Celsius [°C]) at 16.7 pounds per square inch absolute (0.11 MPa). The maximum boil-off gas (BOG) rate is estimated to be 0.89 percent of tank volume per day, based on pure methane.

The storage platform configuration would combine three (3) FSP tanks of approximately 20,000 m^3 per tank for a total of 60,000 m^3 of LNG storage per platform. Each individual FSP tank would have one (1) submersible cryogenic pump (in-tank) for LNG loading, along with all the associated piping and instrumentation for pressure, temperature, and level control. Each tank pump would be sized for a flow rate of 1,200 cubic meters per hour (m^3/hr). Typically, 10 in-tank pumps would be used during loading operations to meet a transfer rate of 12,000 m^3/hr. This transfer rate and the time needed to connect and disconnect the loading arms to the LNG trading carrier would accommodate filling the maximum design LNG trading carrier size (up to 180,000 m^3) within a 24-hour turnaround period (includes pre-/post-loading activities, such as mooring, berthing, loading arm cooling, etc.).

LNG storage platform #3 would be unique in that it would contain four (4) BOG blowers (4x25 percent) designed to move low-pressure gas and would have an electrical building that serves all of the LNG storage platforms. These blowers take suction from the low-pressure BOG header directly connected to the LNG storage tanks and send the BOG to the suction side of the BOG compressors (located on the utilities platform). Four (4) BOG blowers allow the operators to turn on and turn off a single blower at a time to meet the BOG need of the facility.

Flare Platforms

A flare tripod platform equipped with a flare stack, smokeless tips, and ignition system(s) and scrubbers would be provided to safely burn all vented gas. A high-pressure (also known as "cold flare") and low-pressure flare service would be provided. Flares would be a high-velocity "sonic" type that would minimize thermal radiation and maximize dispersion and would have the ability to maintain a high-velocity flare at the widest range of conditions anticipated.

The high-pressure flare would be designed for approximately 194 MMscfd gas flow at 35 psig (0.24 MPa) at temperatures between -17°F and 35°F (-8.3°C and 1.7°C). The low-pressure flare would be designed for approximately 32 MMscfd gas flow at 1 psig (0.007 MPa) at -257°F to -110°F (-160°C to -79°C). To accommodate these flow rates, flare tips would be of nominal sizes—12 inches (30.5 centimeters) for the high-pressure flare and 10 inches (25.4 centimeters) for the low-pressure flare. A vertical flare tower of 131 feet (40 meters) would be provided for a flare platform distance of approximately 85 feet (25.9 meters) from the closest liquefaction trains in order to meet the threshold values for thermal radiation under maximum flaring flowrates and with the wind blowing toward the platforms.

13.2.2.2 LNG Loading Platform and Marine Berth Facilities

LNG Loading Platform

The loading platform would consist of a four (4) pile fixed platform at the marine berth. A marine conventional loading arm system located on the LNG loading platform would be used to load LNG onto LNG trading carriers (see Volume IIa, Section 2.7.7, "LNG Loading System Alternatives"). The loading platform would accommodate a single LNG trading carrier. The loading and marine berth would be capable of handling LNG trading carriers with nominal capacities ranging from 30,000 m^3 up to 180,000 m^3. The loading rate for LNG trading carriers of 30,000 m^3 nominal capacity would be between 4,000 m^3/hr and 6,000 m^3/hr, with a nominal 14-hour turnaround. For LNG trading carriers of 180,000 m^3 nominal capacity, the loading rate would be 12,000 m^3/hr, with a nominal 24-hour turnaround.

The LNG loading system would have two (2) 16-inch (40.6-centimeter) diameter standard liquid arms (5,000 m^3/hr each); one (1) hybrid (liquid/vapor) 16-inch (40.6-centimeter) diameter arm (5,000 m^3/hr liquid service, 25,000 m^3/h vapor service); and one (1) 16-inch (40.6-centimeter) diameter standard vapor arm (25,000 m^3/hr) conditioned with a cool-down loop scheme and an emergency release system or quick disconnect system. All arms would be used to load LNG trading carriers with a 180,000 m^3 nominal capacity. Depending on manifold restrictions, two (2) liquid arms and one (1) vapor arm would be used to load the 30,000 m^3 nominal capacity LNG trading carriers.

Mooring/Breasting Dolphins

The West Delta DWP would include six (6) mooring dolphins and four (4) breasting dolphins (see Volume I, Appendix A, "Figures," Figure 2). This configuration would accommodate the expected range of LNG trading carriers (with nominal capacities between 30,000 m^3 and up to 180,000 m^3). The configuration is designed for mooring loads with the LNG trading carrier moored up to a maximum static wind speed of 60 knots (30 meters per second [m/s]) for large LNG trading carriers ranging between 125,000 m^3 and 180,000 m^3 and up to a maximum static wind speed of 55 knots (28.3 m/s) for 30,000 m^3 LNG trading carriers. For information regarding wave heights during loading operations, see Volume IIa, Section 1.5.3, "Marine Operations." Additional information regarding the system design may be found in Volume III, Attachment 7, "Navigation Assessment," and Attachment 8, "Mooring and Berthing Analysis Report," (both *Confidential*).

13.2.2.3 Support Facilities

Accommodations Platform

The living accommodations platform for West Delta DWP personnel would include:

- Living Quarters Building
- Control Station
- Sewage System
- Survival Capsules
- Helideck
- Potable Water Maker, Tank, and Pressure Set
- Emergency Generator
- Diesel Engine-driven Firewater Pump

Accommodations at the West Delta DWP would be provided for operations and maintenance personnel and would consist of sleeping quarters, a galley, a laundry room and dining room, lounges, activity rooms, offices, meeting rooms, process monitoring, an auxiliary command room, embarkation and receipt of personnel, helideck for airship operations, change rooms, and heating, ventilation and air conditioning (HVAC) systems, in combination, serving as safe harbor for all personnel during emergency events for the normal marine and operations crew, as well as for additional personnel during planned maintenance turnarounds. The anticipated crew size is 32 people, but the accommodations platform would be designed to support up to 36 people to accommodate visiting personnel.

Utilities Platform

The centralized utilities platform would contain common utilities, such as steam power generation, BOG compression, air compression, nitrogen generation, and other support equipment. The platform would be the hub of the non-production portion of the facility. Other than the dedicated emergency generator located on the accommodations platform, all main power and essential power utilized in all areas of the West Delta DWP would be created and distributed from the utilities platform. This platform would be supported by a 14-pile fixed platform structure supported by two (2) fixed platform jackets of seven (7) piles each.

Connecting Bridges

The connecting bridges would allow for placement of piping, electrical, instrument/automation, and for personnel transit between platforms. The bridge between the accommodations and LNG production platforms would be supported midway by a tripod support structure. There would be a total of 11 connecting bridges.

13.3 §148.105(l)(3) Aids to Navigation

In accordance with USCG regulations for aids to navigation, the West Delta DWP would be marked with warning lights and fitted with foghorns to warn all marine vessels in the vicinity of the DWP. Two "phases" of aids to navigation would be used: the first (initial installation) phase would include one (1) temporary set of aids installed on the jackets; the second (final installation) phase would include permanent aids installed on the platform decks.

The West Delta DWP would have a coordinated sound signal, based on multiple foghorn locations, with a rated range of at least 2 nautical miles (2.3 statute miles, or 3.7 kilometers). The sound signal would operate when visibility in any direction is less than 5 nautical miles (5.7 statute miles, or 9.3 kilometers).

In addition to working deck lights for illumination of equipment and facilities on the West Delta DWP, fixed navigation lights would be installed, as required by 33 CFR 67 and the USCG. Navigation warning lights would be installed on each structure. Structures with a maximum horizontal dimension of 30 feet (9.1 meters) or less would have one (1) obstruction light mounted so it is visible from all directions (360º viewable). Structures having a horizontal dimension greater than 30 feet (9.1 meters) and less than 50 feet (15.2 meters) would have two obstruction lights mounted diagonally across from each other. Structures having a horizontal dimension equal to or greater than 50 feet (15.2 meters) would have obstruction lights mounted on each corner. The color of the optic would be white and would display a quick-flash characteristic of approximately 60 flashes per minute, synchronized with all other navigation warning lights at the DWP. The lights would be displayed not less than 20 feet (6.0 meters) above the mean high-water mark and would have a range of at least 5.0 nautical miles (5.8 statute miles, or 9.3 kilometers).

Volume I, Appendix D, "Summarized Basis of Design," (public version), and Volume III, Attachment 13, "Marine Basis of Design," (*Confidential*) provide illustrations of the aids to navigation that would be implemented at the West Delta DWP.

13.4 §148.105(l)(4) Manifold Systems

No manifold systems are anticipated as a part of the proposed West Delta DWP and, as such, none are included in this DPLA.

13.5 §148.105(l)(5) Onshore Storage Areas, Pipelines, and Refineries

13.5.1 Venice Pretreatment Plant

The proposed Venice Pretreatment Plant would be located on an existing 121-acre (49-hectare) onshore natural gas processing facility in Plaquemines Parish, Louisiana, and the Applicant would propose to sublease space within the Venice Gas Complex to install the equipment needed for the proposed natural gas processing and compression facility. Additionally, a proposed 30-inch (76.2-centimeter) diameter pipeline would be installed from the Applicant's proposed Venice Pretreatment Plant located within the Venice Gas Complex, to the proposed West Delta DWP (Figure 1-1).

The Venice Pretreatment Plant would receive natural gas from offshore Gulf of Mexico midstream pipelines and/or interstate pipeline feed gas from pipelines already interconnected with the Venice Gas

Complex. The natural gas would be pre-treated to meet BHGE's LNG liquefaction specifications, compressed onshore, and sent via a proposed 30-inch (76.2-centimeter) diameter pipeline to the West Delta DWP. The proposed Venice Pretreatment Plant would contain the following major components for the pre-treatment and processing of sourced natural gas (refer to Figure 1-4 in Volume IIb, Section 1, "Project Description, and Purpose and Need," for an illustration of these components).

- **Cryogenic Trains.** Two (2) existing cryogenic trains: one train is sized to process up to 300 MMscfd, and a second train is sized to process up to 450 MMscfd. These trains process offshore-sourced gas to extract liquefied petroleum gas products, which is pumped to an existing liquefied petroleum gas export pipeline. Residue gas (after extraction) is compressed into the interstate pipeline system. For the West Delta DWP, the residue gas flow would be redirected and blended with additional interstate pipeline gas, pretreated, and sent to the West Delta DWP.

- **Natural Gas Inlet Compressors**. Three (3) new Solar Centaur 40 natural gas inlet compressors (3x50%) driven by gas turbines (3,500 horsepower each) to deliver up to 600 MMscfd of interstate pipeline feed gas at a delivery pressure of 1,000 psig (6.99 MPa). Gas supplied by these compressors would supplement the residue gas from the existing cryogenic trains. The blended gas would then enter the gas pretreatment packages.

- **Gas Pretreatment Packages**: Four (4) new engineered, modular, prefabricated gas pretreatment trains would provide the 800 MMscfd to 1,200 MMscfd of liquefaction-ready gas to the West Delta DWP. Each pretreatment train would process 200 to 300 MMscfd to meet the West Delta DWP's feed gas specification using residue gas from the existing cryogenic trains blended with interstate pipeline natural gas. The natural gas pretreatment packages would consist of mercury removal units, acid gas removal units, dehydration units, and heavy hydrocarbon removal units. Mercury would be removed from the blended feed gas stream in order to protect liquefaction equipment. The acid gas removal units would remove carbon dioxide and hydrogen sulfide using a conventional amine solvent. These compounds must be removed to prevent freezing during the liquefaction process. The amine solvent would be regenerated using heat from the waste heat recovery units on the gas turbines at the facility. The acid waste gas removed from the amine solvent during the regeneration process would be sent to a flare. Dehydration would use molecular sieve beds contained in adsorber vessels to remove water from the saturated treated gas exiting the acid gas removal unit. Thermal regeneration would be used to desorb water from the molecular sieve beds. Heat for the thermal regeneration would be supplied by the waste heat recovery units on the gas turbines driving electrical power generators at the facility. Heavy hydrocarbons would be removed from the relatively lean feed gas using thermal regeneration to desorb heavy hydrocarbons.

- **Liquefaction-Ready Gas Compressors**. Three (3) new Solar Taurus 60 natural gas compressors (3x50%) driven by gas turbines (5,600 horsepower each) to deliver 750 to 900 MMscfd of liquefaction-ready gas to the West Delta DWP at a 1,000-psig (6.99-Mpa) arrival pressure offshore.

- **Power Generation**. Three (3) new Solar Mars 100 power generation units (3x50%) driven by gas turbines to deliver a total of 27 megawatts (MW) (9 MW each) would be needed to operate the gas pretreatment trains. Each gas turbine would be equipped with waste heat recovery.

- **Waste Heat Recovery/Hot Oil System**. Waste heat recovery units would be installed on the electrical power generation gas turbines. The recovered waste heat and a direct-fired heater would be used to heat circulating thermal oil for process heating. Uses of process heat in the

pretreatment trains would include regeneration of the amine solvent in the acid gas removal units, desorption of water from the molecular sieve dehydration beds, and the heavy hydrocarbon adsorbers.

- **Utilities**. A fuel gas system of 20 MMscfd capacity, a nitrogen generation system, a demineralized water generation system, and compressed air equipment would be installed to support the new gas pretreatment and compression equipment.

- **Flare**. A flare would be installed to combust waste gas from the pretreatment process. This flare would have a continuously lit pilot light and a design capacity of 1,000 MMscfd.

All of the above components would be installed within the Venice Gas Complex and no new undisturbed land would be required for the Project. The plot plan (Figure 1-4 in Volume IIb, Section 1, "Project Description, and Purpose and Need") showing the preliminary equipment layout and full design will be developed during Front End Engineering Design (FEED) and will be provided as a supplemental filing in Q3 2019.

The design life of the Venice Pretreatment Plant when built would be 30 years. Availability of the facility for the Project would align with the requirements of the West Delta DWP—at a minimum, the weighted equivalent of 350 days per year operating at design capacity on a 24-hour/7-day-per-week schedule.

13.5.2 Onshore Pipeline

Liquefaction-ready gas would be supplied from the proposed Venice Pretreatment Plant and a proposed 30-inch (76.2-centimeter) pipeline terminating at the proposed West Delta DWP (Volume I, Appendix A, "Figures," Figure 1). This pipeline would be, in total, 19.8 statute miles (31.9 kilometers) in length, with 4.3 statute miles (6.9 kilometers) onshore in Louisiana (measured from the proposed pig launcher to the high water mark) and 15.5 statute miles (24.9 kilometers) offshore in the Gulf of Mexico.

13.5.3 30-inch In-field Pipeline Header

The proposed 30-inch (76.2-centimeter) in-field pipeline header would be an approximately 0.9-statute-mile (1.4-kilometer) long discharge header connecting the Venice Pretreatment Plant export compressors with the proposed pipeline launcher assembly and pipeline via horizontal directional drill (HDD) (Volume I, Appendix A, "Figures," Figure 20). All HDD staging for drill entry and exit would be located within the existing Venice Gas Complex for segregation safety purposes. There would be a new pigging and valve station installed at the pig launcher assembly location providing access to the proposed 30-inch (76.2-centimeter) onshore pipeline. A new gas metering station for the proposed 30-inch (76.2-centimeter) onshore pipeline would also be located at the pig launcher assembly location. These new components would be installed within the existing Venice Gas Complex and, therefore, no new undisturbed land would be required for the Project.

14 §148.105(m) Site Plan for Marine Components

14.1 §148.105(m)(1) Overall Marine Components Site Plan

The West Delta DWP platforms would be located in West Delta Area Lease Block 44, offshore of Plaquemines Parish, Louisiana, in the Gulf of Mexico. The DWP would consist of 13 platforms sited in water depths ranging from approximately 57 to 60 feet (17.4 to 18.3 meters). The overall site plan of the proposed DWP is illustrated in Figure 2 in Volume I, Appendix A, "Figures." This plan shows the proposed locations of all the marine components. Table 7-1 in Section 7, "§148.105(f) Proposed Location and Use of Deepwater Port," above, details the locations of the marine components of the Project.

Anchorage Areas

In the event that an arriving LNG trading carrier would need to wait near the West Delta DWP until the berth is clear, an anchorage area approximately 3,000 feet (914 meters) in diameter would be designated within the southwestern portion of West Delta Lease Block 44 (see Volume I, Appendix A, "Figures," Figure 18). The final anchorage area chosen would be clear of pipelines or obstructions and navigation routes and of sufficient water depth. This area would also be clear of arriving or departing LNG trading carriers and any ongoing DWP marine operations.

In addition to the anchorage area established for the West Delta DWP, three (3) existing established anchorage areas would be located outside West Delta Lease Block 44 along major shipping safety fairways (see Volume I, Appendix A, "Figures," Figure 19):

- The LOOP anchorage area;
- The Southwest Pass anchorage area; and
- The South Pass anchorage area.

The LOOP anchorage area is reserved for the LOOP DWP and is restricted for outside traffic; therefore, it may not be utilized by LNG trading carriers or other vessels associated with the West Delta DWP. The Southwest Pass anchorage area is available and located to the southeast of West Delta Lease Block 44 along the Southwest Pass shipping safety fairway. The South Pass anchorage area is available but is located farther east of West Delta Lease Block 44 along the South Pass shipping safety fairway. These external anchorage areas may be utilized at the discretion of the LNG trading carrier master for LNG trading carrier bunkering, re-supply, and crew transfer, if required. In the event that these external anchorage areas are judged unsuitable for the conditions or situation by the LNG trading carrier master, an alternate designated anchorage, such as a dedicated anchorage area within West Delta Lease Block 44, may be utilized at the LNG trading carrier master's discretion.

For tug boat anchorage, four mooring buoys would be available west of and in proximity to the LNG loading platform (see Volume I, Appendix A, "Figures," Figure 18). Tug boats would use these buoys to wait until the LNG trading carrier has completed loading LNG and is ready for departure. Tug boats would not routinely anchor at this location in between LNG trading carrier visits; however, they would utilize the anchorage if an arriving LNG trading carrier is waiting at anchor for the berth to clear.

Vessel Traffic Plan

The West Delta DWP would receive LNG trading carriers with nominal capacities between 30,000 m^3 and up to 180,000 m^3. The DWP would allow LNG trading carriers to berth either "port to" or "starboard to." Table 14-1 provides the general characteristics for the range of LNG trading carriers that would call on the DWP. Marine operations are discussed in detail in Volume III, Attachment 7, "Navigation Assessment," and Attachment 8, "Mooring and Berthing Analysis Report," (both *Confidential*).

Table 14-1
General Liquefied Natural Gas Trading Carrier Characteristics

Capacity[1]	30,000 m^3	125,000 m^3	145,000 m^3	174,000 m^3 [2]
Typical Containment System	Type C Independent Tank	Spherical	Spherical	Spherical
Length Overall	594.8 feet (181.3 meters)	892.4 feet (272.0 meters)	950.4 feet (289.7 meters)	977.7 feet (298.0 meters)
Beam	91.9 feet (28.0 meters)	154.8 feet (47.2 meters)	160.8 feet (49.0 meters)	150.3 feet (45.8 meters)
Draft – Maximum Load	25.6 feet (7.8 meters)	35.9 feet (11.0 meters)	39.0 feet (11.9 meters)	39.2 feet (12.0 meters)
Draft – Normal Ballast	22.3 feet (6.8 meters)	29.5 feet (9.0 meters)	30.8 feet (9.4 meters)	30.8 feet (9.4 meters)
Displacement – Maximum Load	30,589 tons (27,750 tonnes)	107,420 tons (97,450 tonnes)	121,775 tons (110,472 tonnes)	145,139 tons (131,668 tonnes)
Displacement – Normal Ballast	10,692 tons (9,700 tonnes)	80,978 tons (73,462 tonnes)	99,459 tons (90,228 tonnes)	106,147 tons (96,295 tonnes)

Notes:
[1] Although the West Delta DWP could accommodate the worldwide fleet of LNG trading carriers, it is anticipated that larger LNG trading carriers will be the most common vessels to call upon the DWP.
[2] The 174,000 m^3 LNG trading carrier is the largest size currently in the world-wide fleet. LNG trading carriers of 180,000 m^3 capacity are under construction and would likely enter service in the next few years.
Key:
DWP = deepwater port
LNG = liquefied natural gas
m^3 = cubic meters

West Delta LNG, LLC's marine operations crew, consisting of mooring/loading master, foreman, and deckhands, would be at the West Delta DWP or LNG trading carrier during all berthing, mooring, and loading of LNG. The mooring/loading master would remain on the LNG trading carrier from the time it enters the safe maneuvering area, throughout LNG loading, and until departure from the safe maneuvering area. LNG trading carriers would be manned by crew regulated by the maritime authority of the flag state or country under which the LNG trading carrier is registered.

Prior to LNG trading carrier arrival, loading, and departure, meetings would take place between the mooring/loading master, facility manager, and LNG trading carrier master to ensure that planned operations are agreeable to all parties and that planned operations would be consistent with current conditions. Berthing could occur during daytime and nighttime hours, but would ultimately be at the discretion of the mooring/loading master, facility manager, and LNG trading carrier master based on the conditions at the time of berthing.

LNG trading carrier berthing/unberthing operations would be conducted in sea states that do not exceed the LNG tug boats' limitations. Typically, significant wave height limits for LNG tug boats are on the order of 4.9 to 6.5 feet (1.5 to 2.0 meters); the lower limit of 4.9 feet (1.5 meters) has been assumed at this time for the limitations of berthing/unberthing operations. During detailed engineering, full mission bridge simulations would be conducted to confirm this assumption and to examine any other limiting criteria from directional dependence. Table 14-2 shows the sea and weather conditions required for berthing at the West Delta DWP based on the previous assumptions. Additional detail regarding metocean conditions are found in Volume III, Attachment 6, "West Delta LNG Export Development Metocean Study Gulf of Mexico," and Attachment 8, "Mooring and Berthing Analysis Report," (*Confidential*).

Table 14-2
Berthing Criteria

Criteria	Operational Limit
Wind Speed	<20.0 knots (10.3 m/s)
Wave Height	<4.9 feet (1.5 meters)
Wave Period	<8.0 seconds
Current Speed	<3.3 ft/s (1.0 m/s)
Berthing Angle	≤6 degrees
Visibility	>3,280 feet (1,000 meters) or at mooring/loading master's and LNG trading carrier master's discretion
Tropical Storm/Hurricane	48 hours berth downtime per event

Key:
ft/s = feet per second
LNG = liquefied natural gas
m/s = meters per second

14.2 *§148.105(m)(2)* Hydrographic Survey

An archaeological resources survey, a shallow hazard survey, and a bathymetric survey were commissioned by West Delta LNG, LLC to investigate potential effects of the Project on two alternative DWP locations corresponding to (a) West Delta Lease Blocks 43 through 46 and (b) portions of Grand Isle Lease Blocks 18 through 21.

An archaeological resources survey was commissioned to obtain the required data as input to prepare the archaeological resources survey report. The survey and analysis of the data were performed in accordance with and comply with Notices to Lessees (NTL) 2005-G07 for Archaeological Surveys and Reports, which requires the archaeological assessment to be prepared and signed by a professional archaeologist, as defined in 36 CFR 61.

The shallow hazards survey was conducted for the same area as the archaeological resources survey. The shallow hazards survey was performed in accordance with guidance and requirements provided in the latest U.S. Department of the Interior, Bureau of Ocean Energy Management (BOEM) specifications for shallow hazard assessments detailed in publication NTL 2008-G05 (extended by NTL 2015-N02) for shallow drilling hazards.

In addition, a bathymetric survey was prepared for each separate geophysical survey area evaluated, corresponding to (a) West Delta Lease Blocks 43 through 46 and (b) portions of Grand Isle Lease Blocks 18 through 21.

14.2.1 Alternative 1 Location (Preferred Alternative)

14.2.1.1 Purpose and Scope

The purpose of this report is to provide results of the seafloor and near-seafloor geologic conditions and identify potential hazards, constraints, and cultural resources that may impact the design and placement of subsea infrastructure within the planned West Delta DWP in the West Delta Protraction Area. The OCS lease blocks investigated include portions of West Delta Lease Blocks 43 through 46. Note that West Delta Lease Blocks 44 and 45 are included in BOEM's Significant Sediment Resources blocks and are governed by NTL No. 2009-G04. Near-seafloor geologic conditions vary across the area, which may require a variety of design considerations. This assessment is based on the interpretation of data collected by Fugro USA Marine, Inc. (Fugro) (see Volume III, Attachment 2, "Shallow Hazards and Archaeological Assessment Surveys for the Deepwater Port," (*Confidential*).

14.2.1.2 Geophysical Data

Data collected by Fugro include multi-beam echo sounder bathymetry (MBES), side-scan sonar (SSS), magnetometer (MAG), sub-bottom profiler (SBP), and high-resolution two-dimensional (HR2D) seismic data. Conductivity-temperature-depth (CTD) data were collected for calibration purposes. MBES and SSS data quality are judged to be good, while SBP and HR2D data quality are fair, considering the limitations of the equipment in shallow environments that potentially contain relatively coarse-grained sediments, organics, and biogenic gas.

14.2.1.3 Water Depth and Seafloor Geomorphology

Water depths range from 51 feet (15.5 meters) in the northeast portion of the study area West Delta Lease Block 46 to 83 feet (14.0 to 25.3 meters) in the southwest portion of the study area in West Delta Lease Block 43. Generally, the seafloor is smooth and featureless and slopes towards the southwest at an angle of less than 0.5 degree. Two subtle highs or ridges trend towards the southwest and can be traced shoreward in regional bathymetry. An area of irregular seafloor texture and shallow depressions produces local slopes of up to 3.8 degrees over the larger of the two ridges.

14.2.1.4 Seafloor and Shallow Subsurface Conditions

Seafloor sediment is likely dominated by silty clay, with potentially minor amounts of sand. The two ridges display high backscatter values, indicating the possibility of slightly coarser sediments in these locations. The seafloor over the main ridge is marked by a slightly rougher texture than the surrounding area as well as irregularly shaped depressions that may have formed from biogenic gas expulsion or underlying delta morphology. Within seafloor depressions on the main ridge, lower backscatter values indicate finer sediments have filled the local low-lying areas.

14.2.1.5 Stratigraphy and Subsurface Conditions

Acoustic penetration of the SBP was limited to approximately 50 feet (15.2 meters) due to likely sand content within channelized sediment and potentially laterally extensive low concentrations of biogenic gas. HR2D data do not indicate significant gas, which implies that concentrations of biogenic gas, if present, are low. HR2D data show a sequence of stacked, undulating units approximately 20 to 30 feet (6.1 to 9.1 meters) thick within the upper approximately 200 feet (60.9 meters) below the mud line (BML). Channels may be present within these units. The uppermost 20 to 30 feet (6.1 to 9.1 meters) of sediment shows

changing character across the study area as follows: (1) to the west of the main ridge, shallow sediments are acoustically transparent, (2) on the main ridge shallow reflectors are discontinuous with a wide range of thicknesses, (3) between the main and secondary ridges undulating parallel reflectors are interspersed with acoustically transparent sediments, and (4) from the secondary ridge eastward parallel bedding becomes more continuous and dips to the southeast. The main ridge was possibly deposited as distributary delta channels and marshes, whereas the secondary ridge appears to be due to outcropping of relatively coarse-grained beds deposited in a pro-delta environment.

14.2.1.6 Conclusions

- Seafloor conditions are generally favorable, but potentially quite variable, within the study area for the planned LNG infrastructure.
- An area of irregular seafloor texture and local depressions may be associated with seepage of biogenic gas or differential compaction of deltaic sediments.
- The top approximately 30 feet (9.1 meters) of sediments are likely silty clay with the potential for a sand component of up to 40 percent.
- Deposits from approximately 30 feet (9.1 meters) BML to approximately 200 feet (60.9 meters) BML are consistent with a rapidly deposited deltaic sequence with relatively high organic content. Therefore, these sediments likely consist of local sand layers within predominantly silt and clay.

14.2.1.7 Recommendations

- A site/foundation investigation utilizing sediment cores or borings is needed to accurately determine the sediment type and geotechnical properties for any specific location within the survey area.

14.2.2 Alternative 2 Location

14.2.2.1 Purpose and Scope

The purpose of this report is to provide results of the seafloor and near-seafloor geologic conditions and identify potential hazards, constraints, and cultural resources that may impact the design and placement of subsea infrastructure within the planned West Delta DWP in the Grand Isle study area. The OCS blocks investigated include portions of Grand Isle Lease Blocks 18 through 21. Near-seafloor geologic conditions are generally favorable and exhibit little variation across the area. This assessment is based on the interpretation of data collected by Fugro (see Volume III, Attachment 2, "Shallow Hazards and Archaeological Assessment Surveys for the Deepwater Port," (*Confidential*).

14.2.2.2 Geophysical Data

Data collected by Fugro include MBES, SSS, MAG, SBP, and HR2D seismic data. CTD data were collected for calibration purposes. MBES and SSS data quality are judged to be good, while SBP and HR2D data quality are fair considering the limitations of the equipment in shallow environments that potentially contain relatively coarse-grained sediments, organics, and biogenic gas.

14.2.2.3 Water Depth and Seafloor Geomorphology

Water depths range from 56 feet (17.1 meters) in the northwest portion of the study area in Grand Isle Lease Block 18 to 68 feet (5.5 to 20.7 meters) in the southeast portion of the study area in Grand Isle

Lease Block 20. Generally, the seafloor is smooth and featureless and slopes towards the southeast at an angle of less than 0.5 degree.

14.2.2.4 Seafloor and Shallow Subsurface Conditions

Seafloor sediment is likely dominated by silty clay. Backscatter generally decreases with increasing water depth, reflecting an expected reduction in surficial sediment grain size with increasing water depth. Throughout the study area, backscatter and SSS data also suggest variability in grain size due to smaller scale bedforms influenced by waves or currents.

14.2.2.5 Stratigraphy and Subsurface Conditions

Acoustic penetration of the SBP was limited to approximately 60 feet (18.3 meters) BML due to likely sand content within channelized sediment and potentially laterally extensive low concentrations of biogenic gas. Acoustic wipeout in SBP data indicate that concentrations of biogenic gas are likely present, but the lack of acoustic wipeout below amplitude anomalies in HR2D data implies that biogenic gas concentrations are low. A number of channels within approximately 55 feet (16.8 meters) of the seafloor are concentrated in the northern part of the study area. The channels may be slightly coarser grained than the surrounding sediments and create preferential migration pathways for biogenic gas. Deeper deposits are consistent with a rapidly deposited deltaic sequence with relatively high organic content. Therefore, these sediments likely consist of local sand layers within predominantly silt and clay.

14.2.2.6 Conclusions

- Seafloor conditions are generally favorable within the study area for the planned LNG infrastructure.
- The top approximately 30 to 60 feet (9.1 to 18.3 meters) of sediments are likely silty clay with less than 20 percent potential for sands.
- Shallow biogenic gas is likely present at low concentrations and increases towards the northeastern study area.
- A number of channels within approximately 55 feet (16.8 meters) of the seafloor are concentrated in the northern part of the study area. The channels may be slightly coarser grained than the surrounding sediments and create preferential migration pathways for biogenic gas.
- Deposits below approximately 60 feet (18.3 meters) BML are consistent with a rapidly deposited deltaic sequence with relatively high organic content and potential sand layers.

14.2.2.7 Recommendations

- A site/foundation investigation utilizing sediment cores or borings is needed to accurately determine the sediment type and geotechnical properties for any specific location within the survey area.
- All previous and existing infrastructure, including four pipelines and two well locations, should be avoided during future construction activities.

15 §148.105(n) Soil Data

To assess geophysical and geotechnical characteristics of the West Delta DWP area and the subsea pipeline route, a Shallow Hazards and Archaeological Assessment was conducted in West Delta Lease Blocks 44 and 45, as presented in Volume III, Attachment 2, "Shallow Hazards and Archaeological Assessment Surveys for the Deepwater Port," (*Confidential*), and a geotechnical investigation was conducted in West Delta Lease Blocks 44, as presented in Volume III, Attachment 4, "Geotechnical Investigation Factual Field Report," (*Confidential*).

The geophysical hazards survey for the subsea pipeline route was conducted in April and May 2019 and the subsea pipeline geophysical survey report can be found in Volume III, Attachment 3a, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," (*Confidential*). A geotechnical survey of the offshore pipeline is scheduled to be completed by the end of Q2 2020, and the Applicant anticipates filing it with USCG and MARAD post-filing in Q3 2020.

The shallow hazards and archaeological assessment of the West Delta DWP area indicates that the seafloor is smooth and featureless and slopes towards the southwest at an angle of less than 0.5 degree. Silt and fine sand are indicated across the survey area with a greater proportion of finer sediments likely in the deeper water depths within the West Delta DWP; seafloor sediments along the proposed pipeline route were comprised of clayey sand to silty clay and are likely to be very soft. Overall, seafloor conditions were determined to be generally favorable within the study area for the proposed DWP infrastructure (Volume III, Attachment 2, "Shallow Hazards and Archaeological Assessment Surveys for the Deepwater Port," [*Confidential*]).

Sub-bottom profiles collected during the site-specific geophysical campaign for West Delta Blocks 44 and 45 are detailed in Volume III, Attachment 2a, "Shallow Hazards and Archaeological Assessment Surveys for the Deepwater Port," (*Confidential*). Silty clay with the potential for a sand component of up to 40 percent is found in the top 30 feet (9.1 meter) of sediment, while deposits from approximately 30 feet (9.1 meters) BML to approximately 200 feet (60.9 meters) BML are likely predominantly silt and clay with local sand layers. Results of the West Delta DWP geophysical investigation indicate that the sediments in the area are generally favorable for the planned infrastructure.

Sediment samples collected from the West Delta DWP area in West Delta Lease Block 44 indicate that the seafloor sediments here include clay, clayey silt, silty clay, and sand. Sediment samples were collected through a 5.5-inch (14.0-centimeter) American Petroleum Institute drill pipe. Samples were classified visually, photographed, and analyzed, as applicable, for water content, unit weight, wet density, strength, and triaxial compression characteristics. Downhole piezocone penetration tests were also performed, to determine soil stratigraphy, derive in situ shear strength of cohesive soils and estimate relative density and frictional characteristics of granular soils. Data from these assessments and information from sub-bottom profiles were reviewed to assess the soils conditions. Full results of these analyses are provided in Volume III, Attachment 4, "Geotechnical Investigation Factual Field Report," (*Confidential*).

In general, the geotechnical data indicate that the surface sediments are composed of loose to medium dense clayey silt interlayered with soft to stiff, lean to silty clay from the mudline to 118 feet (36 meters) BML, and stiff to very stiff clay beneath 118 feet (36 meters) BML, except an interval from 178 to 205 feet (54.3 to 62.5 meters) BML, where a layer of very dense fine sand was identified. Sediments BML generally increase in shear strength with depth.

Overall, the geophysical and geotechnical sampling and testing indicate the following:

- **Soil Suitability**. Based on the integrated results of the geophysical and geotechnical surveys, as well as knowledge of similar subsea structures and flowlines being installed in comparable sediments in the immediate region, the geological and engineering characteristics of the ocean floor and shallow sub-bottom soils are suitable for subsea engineering and installation activities.

- **Seabed Stability**. Based on the geophysical and geotechnical data, the soils at the West Delta DWP location appear suitable to support proposed installation activities, assuming an adequate engineering design. There is no evidence in the surface or subsurface geotechnical data to suggest an unstable seafloor across the study area.

The geotechnical investigation data in West Delta Lease Block 44 suggest that piles can be driven with properly sized pile driving hammers. The penetration required to reach the presented capacities may require driving through dense layers that begin at approximately 118 feet (36 meters) BML as noted in Volume III, Attachment 4, "Geotechnical Investigation Factual Field Report," (*Confidential*). Seafloor sediment along the proposed pipeline route is comprised of clayey sand to silty clay and is likely to be very soft. Denser seafloor sediment may be present on the two seafloor ridges observed in West Delta Lease Block 44 to West Delta Lease Block 46. Overall, pipeline burial by conventional jetting can anticipate encountering minimal resistance throughout the survey area (*Confidential*).

15.1 *§148.105(n)(1)* Soil Suitability

Offshore components that would be fixed to the seafloor include:

- **LNG Production and Storage**
  - Gas Arrival Platform: one (1)
  - LNG Production Platforms: three (3), with two liquefaction trains per platform
  - LNG Storage Platforms: five (5)
  - Flare Platform: one (1)
- **Loading Platform and Marine Berth Facilities**
  - LNG Loading Platform: one (1)
  - Mooring Dolphins: six (6)
  - Breasting Dolphins: four (4)
- **Support Facilities**
  - Accommodations Platform: one (1)
  - Utilities Platform: one (1)

Based on the integrated results of the geophysical data detailed in Volume III, Attachment 2, "Shallow Hazards and Archaeological Assessment Surveys for the Deepwater Port," (*Confidential*), and knowledge of similar subsea structures and flowlines being installed in comparable sediments in the immediate region, the geological and engineering characteristics of the ocean floor and shallow sub-bottom soils are suitable for subsea engineering and installation activities. The soils are suitable for driven piles, given the site-specific pile design parameters provided in Volume III, Attachment 4, "Geotechnical Investigation Factual Field Report," (*Confidential*).

Numerous offshore platform structures and buried subsea pipelines have come to populate the West Delta Protraction Area over the past several decades. The presence of such structures further confirms the suitability of the local soils to support large fixed structures via driven piles and confirms the success of burial to protect subsea pipelines from foreign objects and/or seabed soil erosion/scour.

15.2 *§148.105(n)(2)* Seabed Stability

Based on the geophysical data collected for the DWP and detailed in Volume III, Attachment 2, "Shallow Hazards and Archaeological Assessment Surveys for the Deepwater Port," and Volume III, Attachment 3a, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," (both *Confidential*), there is no evidence on the soil surface or subsurface to suggest an unstable seafloor across the study area. No recent mass transport or slumping seabed deposits are observed in the area from the collected geotechnical data sets. Additionally, the undamaged physical conditions (longevity) of existing infrastructure near the study area further confirm the stability of the seafloor. Thus, the soils along the offshore pipeline route(s) appear suitable to support proposed installation activities assuming an adequate engineering design.

As discussed above, the proposed offshore pipeline would be trenched/buried to a depth of cover of at least 3 feet (0.9 meter) BML, and 10 feet (3 meters) of cover BML in fairways, in accordance with regulatory requirements. Numerous existing pipelines in the area are trenched/buried at similar depths and have remained so for the past several decades. This provides evidence that the burial requirements are historically verified to protect pipelines in the local area against seabed erosion/scour, etc.

HDD techniques would be applied for the proposed pipeline shoreline crossing. This method would ensure that the pipeline is deep enough BML to avoid disturbance and/or influence by future effects of shoreline erosion or accretion. The pipeline would be designed to exit the HDD in water depths greater than 20 feet (6.1 meters), at least 5,000 feet (1,524 meters) from the shoreline (offshore).

16 §148.105(o) Cultural Resources Information

16.1 West Delta DWP

16.1.1 Prehistoric Resources

Water depth and seafloor morphology analyses indicated depths range from 51 feet (15.5 meters) in the northeastern portion of the West Delta DWP survey area (in West Delta Lease Block 46) to 83 feet (25.3 meters) in the southwestern portion of the survey area (in West Delta Lease Block 44). The seafloor is predominantly smooth and featureless and slopes towards the southwest at an angle of less than 0.5 degree. There were no irregular seafloor features identified in the multi-beam bathymetry data that showed immediate evidence of unidentified cultural resources. Acoustic penetration of the SBP was approximately 3 to 52 feet (0.9 to 15.8 meters) below the seafloor. The seafloor was found to be underlain with thinly laminated, variable amplitude reflectors parallel and subparallel to the seafloor. In some areas, the bedding was observed to be rolling and truncated at the seafloor.

The survey area is in a zone of Holocene and recent deltaic deposition associated with the Mississippi River. As indicated above, the earliest delta in the area is the Maringouin. After the river shifted its course to the east, this area became inundated through subsidence and sea level rise; afterwards, the Teche and Lafourche delta complexes extended their sediments across the area. The Pleistocene surface would have comprised a well-drained to marshland environment rich in resources for prehistoric occupation. The Pleistocene surface conditions with the highest possibility of habitation have been determined to be buried under 160+ feet (48.8+ meters) of Holocene sediments. As a result, Project archaeologists have determined that potential prehistoric archaeological features associated with the Pleistocene surface are so deeply buried that the survey area should not be considered a high-probability zone for the occurrence or recovery of prehistoric cultural resources. Further, no landforms were identified within the survey area that could be considered high-probability areas for prehistoric occupations.

Additional information is provided in Volume III, Attachment 2, "Shallow Hazards and Archaeological Assessment Surveys for the Deepwater Port," (*Confidential*).

16.1.2 Historic Resources

The MAG analysis identified 64 magnetic anomalies (Anomaly Nos. 1 through 64) within the West Delta DWP survey area. Of these, 33 magnetic anomalies were found to be associated with existing man-made infrastructure. The remaining 31 unidentified anomalies exhibit amplitudes ranging from 7 to 896 gammas with durations ranging from 47 to 362 feet (14.3 to 110.3 meters). The unidentified anomalies also appear randomly scattered across the survey area or in proximity to existing infrastructure; no clustering was observed, and there were no unexplained magnetic amplitudes or long durations suggestive of buried shipwreck remains. Moreover, no sonar readings were collected in association with these anomalies. Project archaeologists currently surmise that these anomalies represent buried non-diagnostic debris or objects too small to be acoustically detected by sonar. SSS data revealed moderate and uniform reflectivity across the majority of the survey area, which indicates a consistent soil type comprising fine-grained seafloor sediments. Localized increased acoustic reflectivity indicates textural changes consisting of rough- grained sediments. Irregular seafloor topography consisted of a tight array of seafloor depressions in the western portion of the survey area and numerous drag scars created from prior anchoring or trawling activities. Six sonar contacts were recorded within the survey area and are considered to be modern detritus or disturbed

seafloor sediments. No unusual depressions, scours, sediment changes, or unidentified seafloor targets were observed that could represent unidentified shipwreck remains.

Additional information is provided in Volume III, Attachment 2, "Shallow Hazards and Archaeological Assessment Surveys for the Deepwater Port," (*Confidential*).

16.2 Pipeline Route (Federal Waters)

16.2.1 Prehistoric Resources

The proposed pipeline route (federal waters) is located within Blocks 24, 26–28, and 44–46, West Delta Protraction Area. The uppermost Pleistocene sediment lies approximately 180 to 250 feet (54.9 to 76.2 meters) BML across the survey area due to sediment deposition from the Mississippi River delta.

Water depth and seafloor morphology analyses indicated depths that range from 4.7 feet (1.4 meters) below mean sea level in the northeast portion of the survey area (West Delta Lease Block 24) to 75.9 feet (23.1 meters) below mean sea level in the southwest portion of the survey area (West Delta Lease Block 44). The seafloor is predominantly smooth and featureless and slopes toward the southwest at an angle of less than 0.3 degrees (see Volume III, Attachment 3a, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," [*Confidential*]).

Acoustic penetration of the SBP was approximately 3 to 52 feet (0.9 to 15.8 meters) below the seafloor. The seafloor was found to be underlain with thinly laminated, variable amplitude reflectors parallel and subparallel to the seafloor. In some areas, the bedding was undulose and truncated at the seafloor. No geomorphic features that could represent high probability areas for prehistoric archeological sites were interpreted (see Volume III, Attachment 3a, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," [*Confidential*]).

Two subtle highs or ridges (less than 1.5 feet [0.5 meter] in height) were observed in the southern portion of the study area and can be traced shoreward, as shown in regional bathymetry. Areas of irregular seafloor texture and shallow depressions produces local slopes of up to 4.0 degrees over the larger of the two ridges in West Delta Lease Block 44 (see Volume III, Attachment 3a, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," [*Confidential*]). Irregular seafloor features identified as part of the survey did not show immediate evidence of unidentified cultural resources. As stated in Volume III, Attachment 3a, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," [*Confidential*]), "an area of irregular seafloor texture and local depressions may be associated with seepage of biogenic gas or differential compaction of rapidly deposited deltaic sediments."

The survey area is in a zone of Holocene and recent deltaic deposition associated with the Mississippi River. The earliest delta in the area is the Maringouin, active some 6,500 years before present (BP). After the river shifted its course to the east, this area became inundated through subsidence and sea level rise. Approximately 4,200 years BP, the survey area was subjected to another episode of deltaic sedimentation as the lobes of the Teche and Lafourche complexes extended their sediments across the area. The proposed Project area is located in the south of the last deltaic lobe formed by Bayou Lafourche that prograded over earlier lobes from the Lafourche and St. Bernard delta complexes during the last 1,000 years. The area was inundated through subsidence and sea level rise by 600 BP. The near-seafloor sediments represent clays and silts from various later courses of the Mississippi River delta complex that were deposited in an open-shelf environment after the river shifted its main course to the east.

As noted above, within the survey area, the Pleistocene surface would have represented a well-drained to marshland environment rich in resources for prehistoric occupation. The Pleistocene surface

conditions with the highest possibility of inhabitation within the survey area have been determined to be buried under 180+ feet (54.9+ meters) of Holocene sediments; therefore, the potential prehistoric archaeological features associated with the Pleistocene surface are deeply buried. As such, the survey area should not be considered a high-probability zone for the occurrence or recovery of prehistoric cultural resources. Furthermore, no landforms were identified within the survey area that could be considered high-probability areas for prehistoric occupation (see Volume III, Attachment 3a, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," [*Confidential*]).

Additional information for the pipeline is provided in Volume III, Attachment 3a, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," (*Confidential*).

16.2.2 Historic Resources for the Pipeline Route

The MAG analysis identified 841 magnetic anomalies within the survey area. Of these, 475 were found to be associated with existing infrastructure. The remaining 365 unidentified anomalies appeared to be randomly scattered across the survey area or in proximity to existing infrastructure. Only Magnetic Anomaly No. 789 is associated with a sonar contact (Sonar Contact No. 2). No other correlations were made to sonar contacts. Furthermore, no clustering was observed, and no unexplained magnetic amplitudes or long durations were suggestive of buried shipwreck remains. Based on these findings, the anomalies likely represent buried non-diagnostic debris or objects too small to be acoustically detected by sonar (i.e., detritus associated with prior construction, fishing, or shipping activities) (see Volume III, Attachment 3a, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," [*Confidential*]).

As noted in Volume III, Attachment 3a, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," (*Confidential*), SSS data revealed moderate and uniform reflectivity across the majority of the survey area, which indicates a homogenous soil type, likely of find-grained seafloor sediments. Localized areas of increased acoustic reflectivity indicate textural changes comprising rough or grainy sediments. Irregular seafloor topography, including numerous seafloor depressions, was present in the western portion of the survey area. In addition, numerous drag scars created from prior anchoring or trawling activities were located throughout the pipeline corridor. Four sonar contacts were recorded within the survey area in federal waters and are considered to be modern detritus or disturbed seafloor sediments. No unusual depressions, scours, sediment changes, or unidentified seafloor targets were observed that could represent unidentified shipwreck remains.

In addition to the geophysical survey, desktop reviews of previously identified shipwrecks were conducted. A shipwreck was noted as being within the APE. While not identified as part of the geophysical survey, the *Botrug 5* is reported to be located approximately 2,482 feet (756.5 meters) northwest of the proposed pipeline (see Volume III, Attachment 3a, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," [*Confidential*]).

Additional information is provided in Volume III, Attachment 3a, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," (*Confidential*).

16.3 Pipeline Route (State Waters)

16.3.1 Prehistoric Resources

The proposed pipeline route (located in State waters) is sited northeast of West Delta Lease Block 26. The uppermost Pleistocene sediment lies approximately 250+ feet (76.2+ meters) BML across the survey area due to sediment deposition from the Mississippi River delta.

The survey area is in a zone of Holocene and Recent deltaic deposition associated with the Mississippi River. The earliest delta in the area is the Maringouin, active some 6,500 years BP. After the river shifted its course to the east, this area became inundated through subsidence and sea level rise. Approximately 4,200 years BP, the survey area was subjected to another episode of deltaic sedimentation as the lobes of the Teche and Lafourche complexes extended their sediments across the area. The proposed Project area is located in the south of the last deltaic lobe formed by Bayou Lafourche that prograded over earlier lobes from the Lafourche and St. Bernard delta complexes during the last 1,000 years. The area was inundated through subsidence and sea level rise by 600 BP. The near-seafloor sediments represent clays and silts from various later courses of the Mississippi River delta complex that were deposited in an open-shelf environment after the river shifted its main course to the east.

As noted above, within the survey area, the Pleistocene surface would have represented a well-drained to marshland environment rich in resources for prehistoric occupation. However, the highest Pleistocene era surface conditions that could have supported habitation are buried under 180 to 250 feet (54.9 to 76.2 meters) of Holocene sediments throughout the survey area. Since possible prehistoric archaeological features (associated with the Pleistocene surface) are so deeply buried, the survey area should not be considered a high-probability zone for the occurrence or recovery of prehistoric cultural resources.

As noted in Volume III, Attachment 3b, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," (*Confidential*), the remote sensing data collected as part of geophysical surveys revealed no landscape features likely to contain drowned prehistoric sites.

The Final Phase I Cultural Resources Survey of the West Delta to Venice Pipeline Project will be provided as a supplemental filing in Q4 2019; however, a draft report is included with this filing (see Volume III, Attachment 3b, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," [*Confidential*]).

16.3.2 Historic Resources

The MAG analysis identified 251 magnetic anomalies within the state waters portion of the survey area. Two anomaly clusters were identified. The first anomaly is located near the start of the state waters corridor and consists of anomalies 364, 367, 371, 373, and 488; the cluster was approximately 430 feet (131 meters) northwest of the centerline of the proposed pipeline. The second cluster consists of anomalies 60, 63, 68, 79, 87, 91, 94, 102, 107, 111, and 121; the cluster is approximately 30 feet (9.1 meters) northwest of the centerline of the proposed pipeline. The clusters are likely buried, modern debris (see Volume III, Attachment 3b, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," [*Confidential*]).

As noted in Volume III, Attachment 3b, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," (*Confidential*), SSS data recorded a moderately reflective seafloor, characterized by trawl and drag scars. No sonar contacts were recorded within the state waters portion of the survey area.

The Final Phase I Cultural Resources Survey of the West Delta to Venice Pipeline Project will be provided as a supplemental filing in Q4 2019; however, a draft report is included with this filing (see Volume III, Attachment 3b, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," [*Confidential*]).

17 §148.105(p) Vessel Operational Information

An Operations and Maintenance Philosophy is provided in Volume III, Attachment 23, (*Confidential*). In addition, a full Port Operations Manual (OPMAN) will be developed for the proposed West Delta DWP; a proposed table of contents for the operations manual is included in Volume III, Attachment 24, "Operations Manual with Security Plan," (*Confidential*).

West Delta LNG, LLC would contract with LNG trading carriers from the worldwide fleet for exporting LNG to customers around the world; however, the LNG trading carriers are not considered part of the Project. The LNG trading carriers calling on the West Delta DWP would have nominal cargo capacities ranging from 30,000 to 180,000 m^3. The DWP would facilitate LNG trading carriers berthing at the proposed DWP for LNG loading. The loading platform would accommodate one carrier at a time. For LNG trading carriers of 180,000-m^3 capacity, West Delta LNG, LLC anticipates a steady state loading rate of 12,000 m^3 that would allow a 24-hour turnaround period, including time for berthing, system connections, and custody transfer administration. For LNG trading carriers of 30,000 m^3 capacity, West Delta LNG, LLC anticipates differentially shorter loading and turnaround times of 14 hours. Once loaded, the LNG trading carriers would depart the DWP to transport the cargo to various export markets worldwide.

17.1 §148.105(p)(1) LNG Trading Carrier Registry and Nationality of Crew

The LNG trading carriers that would call on the West Delta DWP would come from the entire worldwide fleet. As of the end of 2017, the world's LNG trading carrier fleet consisted of 478 LNG trading carriers, including carriers actively trading, those sitting idle and available, and those being used as floating storage and regasification units, with another 65 LNG trading carriers expected to be delivered worldwide in 2018 and more than 100 on order with expected delivery in the next few years.[6] The storage capacities of LNG trading carriers range from 18,000 to 266,000 m^3; however, for purposes of the global fleet, only LNG trading carriers with greater than 60,000 m^3 capacity are considered, and the average storage capacity for the newbuild LNG trading carriers delivered and ordered during 2017 was between 170,000 to 180,000 m^3.

The global LNG trading carrier fleet carries the flags of numerous countries. The vessels allowed to call at the West Delta DWP would comply with the Safety of Life at Sea Convention, the International Gas Carrier Code, and other international safety and pollution prevention standards applicable to LNG trading carriers. The crews serving aboard these vessels also hail from the international community and will hold the appropriate license and certification required by the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978.

[6] International Gas Union. 2018 IGU World LNG Report 27th World Gas Conference, 2018 Edition. https://www.igu.org/sites/default/files/node-document-field_file/IGU_LNG_2018_0.pdf.

17.2 §148.105(p)(2) Operations Manual Contents Regarding Vessel Characteristics and Weather Forecasting

The West Delta LNG OPMAN will cover all aspects of port operations from the time a vessel bound for the West Delta DWP enters the safety zone to the time it leaves the safety zone during its departure from the port. In addition to providing the rules for safe operation, the manual will describe the organization and hierarchy of port officials with specific authorities, responsibilities, and required competencies. It also will deal with the required communications and reports and provide emergency response procedures to be followed if an incident occurs. The OPMAN will include vessel traffic regulations, security provisions, and the operational limits of simultaneous activities. Principal features, capacities, and limits of operation to be covered in the operations manual are summarized below. See Volume III, Attachment 24, "Operations Manual with Security Plan," (*Confidential*), for the proposed table of contents for the OPMAN.

17.2.1 Restrictions on Vessel Operations

The standard LNG trading carriers visiting the West Delta DWP to export LNG would be subject to a wide array of government restrictions and DWP rules. Government restrictions are contained in published codes and circulars. Security provisions may include restrictions that change from time to time. Compliance with all applicable rules and restrictions requires that the owners of ships visiting the DWP have copies of or access to all applicable provisions. They also must receive advance notice of changes and other security restrictions. The operator would accomplish this by maintaining a standing instruction for visiting ships and updating the instruction as required and by requiring that owners' agents attest to a knowledge of and compliance with the instructions and referenced rules and regulations. The requirements will be fully described in the OPMAN (Volume III, Attachment 24, "Operations Manual with Security Plan," (*Confidential*).

17.2.2 LNG Trading Carriers

LNG trading carriers calling on the West Delta DWP (Volume I, Appendix A, "Figures," Figure 2) would be drawn from the existing and future global fleet of specialized LNG trading carriers compatible with the Project's offloading system and that are able to operate within the environmental and safety specifications that would be required at the DWP. The fleet that would operate at the DWP would be required to meet all applicable federal and state laws and regulations.

17.2.3 Weather Forecasting

West Delta LNG, LLC would subscribe to one or more professional meteorology consulting firms specializing in providing weather forecasting information to the offshore oil and gas industry. West Delta LNG, LLC would monitor official forecasts from the National Weather Service and National Hurricane Center (during hurricane season) and consider the additional advice of contracted meteorology consulting firms in developing responses to predicted hazardous weather.

The LNG trading carriers and the West Delta DWP support vessels would be equipped with weather-monitoring facilities providing each Vessel Master with detailed and up-to-date weather information at the DWP. The LNG trading carriers also would be equipped with Global Maritime Distress and Safety System equipment, which would automatically receive weather forecasting information. The specific procedures for monitoring weather conditions and the criteria that would result in the LNG trading

carriers disconnecting and departing the DWP will be fully described in West Delta LNG Project's OPMAN (Volume III, Attachment 24, "Operations Manual with Security Plan," (*Confidential*).

18 §148.105(q) Floating Components

The West Delta DWP would not have any floating components as described in 33 CFR 148.105(q) and 33 CFR 148.105(r). Information on fixed components is provided in Section 19, "§148.105(r) Fixed Offshore Components," below.

18.1 §148.105(q)(1) Floating and Offshore Components Descriptions and Drawings

No floating structures are anticipated as a part of the West Delta DWP and, as such, none are included in this DPLA. The LNG trading carriers that would call on the DWP to load LNG are not considered Project components but are discussed throughout the section and within Volume IIa, Section 1, "Project Description, and Purpose and Need."

18.2 §148.105(q)(2) Floating Offshore Components Design Criteria

No floating structures are anticipated as a part of the West Delta DWP and, as such, none are included in this DPLA. Volume I, Appendix D, "Summarized Basis of Design," provides the basis of design, including design criteria for West Delta LNG Project components.

18.3 §148.105(q)(3) Floating Offshore Components Design Standards and Codes

No floating structures are anticipated as a part of the West Delta DWP and, as such, none are included in this DPLA. Volume I, Appendix D, "Summarized Basis of Design," includes the basis of design, including design standards and codes for West Delta LNG Project components.

18.4 §148.105(q)(4) Floating Offshore Components Engineering Practices

No floating structures are anticipated as a part of the West Delta DWP and, as such, none are included in this DPLA. Volume I, Appendix D, "Summarized Basis of Design," includes the basis of design, including design standards and codes for West Delta LNG Project components.

18.5 §148.105(q)(5) Safety, Firefighting, and Pollution Prevention Equipment

No floating structures are anticipated as a part of the West Delta DWP and, as such, discussion on safety, firefighting, and pollution prevention equipment is not included in this DPLA.

18.6 §148.105(q)(6) Lighting on Floating Hoses for Night Detection

This regulation does not apply, as the proposed Project would not utilize floating hoses.

19 §148.105(r) Fixed Offshore Components

The proposed West Delta DWP would consist of fixed components, as described in 33 CFR 148.105(r) (this section).

19.1 §148.105(r)(1) Fixed Offshore Components Descriptions and Drawings

Section 13.2, "§148.105(l)(2) Fixed Structures," above, describes the West Delta DWP platforms and associated fixed components. Drawings are provided in Volume I, Appendix A, "Figures," Figure 5 through Figure 16.

19.2 §148.105(r)(2) Fixed Offshore Components Design Criteria

Volume I, Appendix D, "Summarized Basis of Design," includes the basis of design, including design criteria for West Delta LNG Project components, including fixed offshore components.

19.3 §148.105(r)(3) Fixed Offshore Components Design Standards and Codes

Volume I, Appendix D, "Summarized Basis of Design," includes the basis of design, which provides design criteria for West Delta LNG Project components, including fixed offshore components. Table 1 in Appendix D provides a list of federal regulatory codes. Table 19-1, below, provides a complete list of all federal regulations and codes, standards, and guidelines as they apply to the fixed offshore components.

Table 19-1
Federal Regulations and Codes, Standards, and Guidelines

Document No.	Description
Federal Regulations and Codes	
29 Code of Federal Regulations (CFR) 1910	Occupational Safety and Health Standards
29 CFR 1910.36	Design and Construction Requirements for Exit Routes
29 CFR 1910.39	Subpart E, Fire Prevention Plans
29 CFR 1910.95	Occupational Noise Exposure
29 CFR 1910.110	Storage and Handling of Liquefied Petroleum Gases
29 CFR 1910.119	Process Safety Management of Highly Hazardous Chemicals

Table 19-1
Federal Regulations and Codes, Standards, and Guidelines

Document No.	Description
30 CFR 250	Department of Interior (DOI) – Oil and Gas and Sulphur Operations in the Outer Continental Shelf
30 CFR 250.900 to 921	Subpart I, Platforms and Structures
32 CFR 706	Certifications and Exemptions under the International Regulations for Preventing Collisions at Sea, 1972
33 CFR Chapter 1	Navigation and Navigable Waters, U.S. Coast Guard and Homeland Security
33 CFR 67	Aids to Navigation on Artificial Islands and Fixed Structures
33 CFR 105	Maritime Security: Facilities
33 CFR 127.307	Liquefied Natural Gas Waterfront Facilities
33 CFR 143.110 to 120	United States Coast Guard
33 CFR 146.140	Emergency Evacuation Plan
33 CFR 148	Deepwater Ports: General
33 CFR 149	Deepwater Ports: Design, Construction, and Equipment
33 CFR 149.310	Muster and Embarkation Requirements for Survival Craft
33 CFR 150	Deepwater Ports: Operations
33 CFR 151.10	Control of oil discharges
33 CFR 151.73	Operating requirements: Discharge of garbage from fixed or floating platforms
33 CFR 160	Ports and Waterways Safety
33 CFR 154.1035	Specific requirements for facilities that could reasonably be expected to cause significant and substantial harm to the environment.
33 CFR 322	Permits for Structures in or Affecting Navigable Waters of the United States
33 CFR Subchapter N	Outer Continental Shelf Activities
33 CFR Subchapter NN	Deepwater Ports
33 CFR Subchapter O	Pollution
33 CFR 160	Ports and Waterways Safety
40 CFR 51	Protection of Environment – Requirements for Preparation, Adoption, and Submittal of Implementation Plans
40 CFR 1508	Protection of Environment
46 CFR 108	Design and Equipment
46 CFR 108.540	Survival Craft Muster and Embarkation Arrangements
46 CFR 154	Safety Standard for Vessel Carrying Bulk Liquefied Gases
49 CFR 192	U.S. Department of Transportation – Transportation of Natural and Other Gas by Pipeline
49 CFR 193	Liquefied Natural Gas Facilities: Federal Safety Standards
Federal Register, Vol. 77, No. 97, May 18, 2012	Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act; Analysis and Sampling Procedures
Standards	
American Bureau of Shipping (ABS)	Rules for Building and Classing Offshore Installations (2018)
American Institute of Steel Construction (AISC) 303	Code of Standard Practice for Steel Buildings and Bridges

Table 19-1
Federal Regulations and Codes, Standards, and Guidelines

Document No.	Description
AISC 360	Specifications for Structural Steel Buildings
AISC Design Guide 24	Hollow Structural Section Connections
American National Standards Institute/Instrumentation Systems Automation Society (ANSI/ISA) 84.01	Application of Safety Instrumented Systems for the Process Industries
ANSI/ISA-99	Security for Industrial Automation and Control Systems
ANSI/ National Electrical Manufacturers Association (NEMA) MG-1	Motors and Generators
American Petroleum Institute (API) Std 620-Q	Design and Construction of Large, Welded Low Pressure Storage Tanks
API Spec 2A	Specification for Subsurface Safety Valve Equipment
API Spec 2B	Specification for the Fabrication of Structural Steel Pipe
API Spec 2C	Offshore Pedestal-mounted Cranes
API Spec 2F	Specification for Mooring Chain
API Spec 2H	Specification for Carbon Manganese Steel Plate for Offshore Structures
API Spec 2W	Specification for Steel Plates for Offshore Structures, Produced by Thermo-Mechanical Control Processing (TMCP)
API Spec 5L/ISO 3183	Specification for Line Pipe
API Spec 6D/ISO 14313	Specification for Pipeline and Piping Valves
API Spec 6H	Specifications for End Closures, Connectors, and Swivels
API Spec Q1	Specification for Quality Management System Requirements for Manufacturing Organizations for the Petroleum and Natural Gas Industry
API Spec Q2	Specification for Quality Management System Requirements for Service Supply Organizations for the Petroleum and Natural Gas Industries
American Society of Mechanical Engineers (ASME)/American National Standards Institute (ANSI) B31.1	Power Piping
ASME/ANSI B31.3	Process Piping
ASME B31.4	Pipeline Transportation Systems for Liquids and Slurries
ASME/ANSI B31.5	Standards for Refrigeration Piping
ASME B31.8	Gas Transmission and Distribution Piping Systems
ASME Boiler and Vessel Pressure Code	Section VIII – Pressure Vessels
American Society for Testing and Materials (ASTM) A36	Standard Specification for Carbon Structural Steel
ASTM A53	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

Table 19-1
Federal Regulations and Codes, Standards, and Guidelines

Document No.	Description
ASTM A106	Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service
ASTM A131	Standard Specification for Structural Steel for Ships
ASTM A500	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A501	Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A992	Standard Specification for Structural Steel Shapes
ASTM F1166	Standard Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities
American Welding Society (AWS) D1.1	Structural Welding Code - Steel
British Standards Institute (BS) EN 10025	Hot rolled products of structural steels
BS EN 10225	Weldable Structural Steels for fixed offshore structures
BS EN 1473. 2007	Installation and Equipment for liquefied natural gas- Design of onshore installations.
Canadian Standards Association Z276-18	Canadian Standards Association. Liquefied natural gas (LNG) — Production, storage, and handling.
Det Norske Veritas/Germanischer Lloyd (DNVGL) ST N001	Marine operations and marine warranty
International Electrotechnical Commission (IEC) 62443-1-1	Industrial Communication Networks and System Security
Japanese Industrial Standards G3466	Carbon steel square for general structural purposes
IEC 61511	Functional Safety - Safety Instrumented Systems for the Process Industry Sector
International Maritime Organization (IMO) Gas Code	International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, and amendments, July 2016.
IMO/Maritime Pollution (MARPOL)	International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (MARPOL 73/78)
International Organization for Standardization (ISO) 15589-2	Petroleum, Petrochemical and Natural Gas Industries – Cathodic Protection of Pipeline Transportation Systems – Part 2: Offshore Pipelines
ISO 13702	Control and Mitigation of Fires and Explosions on Offshore Production Installations
ISO 19901-5	Petroleum and Natural Gas Industries – Specific Requirements for Offshore Structures – Part 5: Seismic Design Procedures and Criteria
NACE SP0176	Corrosion Control of Submerged Areas of Permanently Installed Steel Offshore Structures Associated With Petroleum Production
NEMA	Electrical Standards
National Fire Protection Association (NFPA) 10	Standard for Portable Fire Extinguishers

Table 19-1
Federal Regulations and Codes, Standards, and Guidelines

Document No.	Description
NFPA 11	Standard for Low-, Medium-, and High-Expansion Foam
NFPA 13	Standard for the Installation of Sprinkler Systems
NFPA 14	Installation of Standpipe and Hose Systems
NFPA 15	Standard for Water Spray Fixed Systems for Fire Protection
NFPA 16	Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems
NFPA 17	Standard for Dry Chemical Extinguishing Systems
NFPA 17A	Standard for Wet Chemical Extinguishing Systems
NFPA 20	Standard for the Installation of Stationary Pumps for Fire Protection
NFPA 24	Installation of Private Fire Service Mains and Their Appurtenances
NFPA 30	Flammable and Combustible Liquids Code
NFPA 37	Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines
NFPA 55	Compressed Gases and Cryogenic Fluids Code
NFPA 59A	Standard for the Production, Storage and Handling of LNG
NFPA 70	National Electrical Code
NFPA 72	National Fire Alarm and Signaling Code
NFPA 80	Standard for Fire Doors and Other Opening Protectives
NFPA 90A	Standard for the Installation of Air Conditioning and Ventilating Systems
NFPA 90B	Standard for the Installation of Warm Air Heating and Air-Conditioning Systems
NFPA 101	Life Safety Code
NFPA 496	Recommended Practices for the Classification of Flammable Liquids, Gases, or Vapors of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
NFPA 750	Standard on Water Mist Fire Protection Systems
NFPA 1962	Standard on Fire Hose
NFPA 1963	Standard for Fire Hose Connections
NFPA 2001	Standard on Clean Agent Fire-Extinguishing Systems
Panama Canal Authority Notice to Shipping No. N-1-2018	Vessel Requirements for the Panama Canal (updated annually)
Unified Facilities Criteria (UFC) 4-150-06	Military Harbors and Coastal Facilities, December 12, 2001 with Change 1, October 19, 2010
UFC 4-159-03	Design Moorings
U.S. Coast Guard (USCG)	USCG Aids to Navigation Technical Manual

Table 19-1
Federal Regulations and Codes, Standards, and Guidelines

Document No.	Description
Guidelines	
ABS	Guide for Building and Classing Facilities on Offshore Installations, January 2014 (Updated February 2014) Guidance Notes on Building and Classing Offshore LNG West Delta DWPs, April 2004 (Updated April 2008)
ABS 29	Rules for Building and Classing Offshore Installations, 2018
ABS 106	Guide for Building and Classing Gravity-Based Offshore LNG Terminals
ABS 115	Guide for the Fatigue Assessment of Offshore Structures
ABS 197	Guidance Notes of Accidental Load Analysis and Design for Offshore Structures
ABS 126	Guide for Buckling and Ultimate Strength Assessment for Offshore Structures
API Bulletin 91	Planning and Conducting Surface Preparation and Coating Operations for Oil and Natural Gas Drilling and Production Facilities in a Marine Environment
API RP 2A-WSD	Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms – Working Stress Design
API RP 2D	Operation and Maintenance of Offshore Cranes
API RP 2EQ	Seismic Design Procedures and Criteria for Offshore Structures
API RP 2FB	Recommended Practice for Design of Offshore Facilities Against Fire and Blast Loading
API RP 2GEO	Geotechnical and Foundation Design Considerations
API RP 2MET	Derivation of Metocean Design and Operating Conditions
API RP 2L	Recommended Practice for Planning, Designing and Constructing Heliports for Fixed Offshore Platforms
API RP 2SIM	Structural Integrity Management of Fixed Offshore Structures
API RP 2T	Planning, Designing and Constructing Tension Leg Platforms
API RP 6D	Specifications for Pipeline Valves
API RP 14B	Design, Installation, Repair and Operation of Subsurface Safety Valve Systems
API RP 14C	Recommended Practice for Analysis, Design, Installation and Testing of Basic Surface Safety Systems for Offshore Petroleum Platforms
API RP 14E	Recommended Practice for Design and Installation of Offshore Production Platform Piping Systems
API RP 14F	Recommended Practice for Design and Installation of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities
API RP 14FZ	Recommended Practice for Design, Installation, and Maintenance of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class I, Zone 0, Zone 1, and Zone 2 Locations
API RP 14G	Recommended Practices for Fire Prevention and Control on Open Type Offshore Production Platforms
API RP 14J	Recommended Practice for Design and Hazards Analysis for Offshore Production Facilities
API RP 70	Security for Offshore Oil and Natural Gas Operations
API RP 75	Recommended Practice for Development of a Safety and Environmental Management Program for Offshore Operations and Facilities
API RP 95J	Gulf of Mexico Jackup Operations for Hurricane Season

Table 19-1
Federal Regulations and Codes, Standards, and Guidelines

Document No.	Description
API RP 505	Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1 and Zone 3
API RP 520	Sizing, Selection, and Installation of Pressure-Relieving Devices
API RP 521	Guide to Pressure Relief and Depressurizing Systems
API RP 1110	Recommended Practice for the Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids, or Carbon Dioxide
API RP 1111	Design, Construction, Operation, and Maintenance of Offshore Hydrocarbon Pipelines
API 2030	Guidelines for the Application of Water Spray Systems for Fire Protection in the Petroleum Industry
API 2510	Design and Construction of LPG Installations
API 2510A	Fire-Protection Considerations for the Design and Operation of Liquefied Petroleum Gas (LPG) Storage Facilities
AUT-GDL-4801	Wood Automation and Control Development System Security Guideline, Rev. 0, April 2016
Det Norske Veritas (DNV) OTG-02	Floating Liquid Gas Facilities, Offshore Technical Guidance OTG-02.
DNVGL RP B401	Cathodic Protection Design
DNVGL RP C205	Environmental Conditions and Environmental Loads
DNVGL RP F103	Cathodic Protection of Submarine Pipelines
DNVGL RP F105	Free Spanning Pipelines
Helicopter Safety Advisory Council RP 2016-1	Helideck Design Guidelines (New Builds)
NFPA 67	Guide on Explosion Protection for Gaseous Mixtures in Pipe Systems
National Institute of Standards and Technology (NIST)	Application of the U.S. NIST Framework for Improving Critical Infrastructure Cybersecurity, Version 1.1, April 16, 2018. (NIST Framework)
Navigation and Vessel Inspection Circulars 03-05	USCG Navigation and Vessel Inspection Center: Guidance for Oversight of Post-Licensing Activities Associated with Development of Deepwater Ports (DWPs)
Oil Companies International Marine Forum (OCIMF)	Design and Construction Specification of Marine Loading Arms, 3rd Edition – 1999 Guidelines and Recommendations for the Safe Mooring of Large Ships at Piers and Sea Islands (1997) International Safety Guide for Oil Tankers and Terminals (ISGOTT), 5th Edition - 2006 Liquefied Gas Handling Principles on Ships, 3rd Edition - 1999 Manning at Conventional Marine Terminals, June 2008 Mooring Equipment Guidelines, MEG 3, 3rd Edition - 2008
OCIMF 4	Design and Construction Specifications for Marine Loading Arms
OCIMF 20	Mooring Equipment Guidelines

Table 19-1
Federal Regulations and Codes, Standards, and Guidelines

Document No.	Description
OCIMF 1999	Design and Construction Specification of Marine Loading Arms
OCIMF 2018	Mooring Equipment Guidelines (MEG4)
Permanent International Association of Navigation Congresses (PIANC)	Guidelines for the Design of Fender Systems (2002)
PIANC Report 121	Harbor Approach Channels Design Guidelines, 2014
PIANC Supplement to Report 16	Big tankers and their reception (data-fairways-berths), 1973
PIANC: PTC2 WG04	Dangerous Goods in Ports: Recommendations for Port Designers and Port Operators, 1985, Supplement to Bulletin No. 49
PIANC: PTC2 WG05	Underkeel Clearance for Large Ships in Maritime Fairways with Hard Bottom, 1985
PIANC Report 116	Safety Aspect Affecting the Berthing Operations of Tankers to Oil and Gas Terminals, 2012
PIANC Report 99	Considerations to Reduce Environmental Impacts of Vessels, 2008
PIANC WG34	Seismic Design Guidelines for Port Structures, Report of Working Group No.34, 2001
PIANC WG35	Dangerous Cargoes in Ports, Report of Working Group 35, 2000
Sandia National Laboratories 2004	Sandia National Laboratories, "Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water," Albuquerque, New Mexico 87185 and Livermore, California 94550, December 2004.
Society of International Gas Tanker and Terminal Operators (SIGTTO)	Liquefied Gas Handling Principles on Ships and in Terminals, 3rd Edition, 2000 Prediction of Wind Loads on Large Liquefied Gas Carriers Ship/Shore Interface Safe Working Practice for LPG and Liquefied Chemical Gas Cargoes, 1997 Manifold Recommendations for Liquefied Gas Carriers, First Edition, 2011
SIGTTO IP No. 14	Site Selection and Design for LNG Ports and Jetties (1997)
SIGTTO IP No. 15	A Listing of Design Guidelines of Liquefied Gas Terminals (1997)
US Department of Homeland Security	Improving Industrial Control Systems Cybersecurity with Defense-in-Depth Strategies

19.4 *§148.105(r)(4)* Fixed Offshore Components Engineering Practices

Volume I, Appendix D, "Summarized Basis of Design," includes the basis of design, which provides engineering practices for West Delta LNG Project components, including fixed offshore components.

19.5 §148.105(r)(5) Lighting, Safety, Lifesaving, Firefighting, Pollution Prevention, and Waste Treatment Equipment

19.5.1 §148.105(r)(5)(i) Navigational Lighting

Navigational aids for the West Delta DWP would include permanent navigational aids, such as foghorns and beacons. Navigational aids would provide navigation warnings to vessel traffic in the area of the offshore platforms. The design and layout would meet all regulatory requirements for navigational aids of an offshore platform. Details on navigational aids specific to the proposed DWP are provided in Section 13.3, "§148.105(l)(3) Aids to Navigation," above.

19.5.2 §148.105(r)(5)(ii) Safety Equipment

The West Delta DWP has been designed to ensure safe operations and to meet or exceed industry standards. Personnel safety and environmental protection are the top priorities for the Project. In this regard, both design and construction activities focus on methods to accomplish these priority objectives through inherently safer design, engineering control and mitigation, and administrative mitigation.

Safety Plans

Project design, construction, and operations will be subject to risk assessments and health and safety plans at all stages of the Project, as described in Volume IIa, Section 1.5.2.5, "Health and Safety," and included in the following:

- Fire and Gas Detection Philosophy (Volume III, Attachment 16 [*Confidential*])
- Fire Protection and Firefighting Philosophy (Volume III, Attachment 17 [*Confidential*])
- LNG Storage Study (Volume III, Attachment 21 [*Confidential*])
- HAZID Report (Volume III, Attachment 22 [*Confidential*])
- Operations and Maintenance Philosophy (Volume III, Attachment 24 [*Confidential*])
- Operations Manual with Security Plan (Volume III, Attachment 25 [*Confidential*])
- LNG Spill Response Plan (Volume III, Attachment 26 [*Confidential*])
- LNG Export Development Spill Consequence Analysis (Volume III, Attachment 27 [*Confidential*])
- Emergency Shutdown Philosophy (Volume III, Attachment 28 [*Confidential*])
- Emergency Egress, Evacuation, and Rescue Plan (Volume III, Attachment 29 [*Confidential*])
- Process Hazards Analysis Report (Volume III, Attachment 31 [*Confidential*])
- Flare Radiation and Flameout Study (Volume III, Attachment 32 [*Confidential*])
- Process Safety Philosophy (Volume III, Attachment 33 [*Confidential*])

19.5.3 §148.105(r)(5)(iii) Lifesaving Equipment

Several health and safety issues were considered, and the West Delta DWP was designed to mitigate these health and safety issues for DWP personnel. The following list summarizes the issues considered:

- Life-saving equipment, such as:
  - Lifeboats on the utilities, LNG storage, and accommodations platforms;

  - Life rafts for each platform as additional means of evacuation to sea;
  - Lifejackets, smoke hoods, and other personal protective devices;
  - Lifebuoys (including appropriate launching and signaling devices);
  - First aid and rescue equipment (high-speed rescue boat for man overboard scenarios, helicopter crash kits, etc.);
  - Eyewash stations and safety showers; and
  - Breathing apparatus sets and emergency air supplies;
- Cryogenic protection;
- Hot surfaces;
- Flammable gas;
- Flammable liquids;
- Access and egress;
- Crane and lifting operations;
- Vessel maneuvering and berthing;
- Maintenance access;
- Noise;
- Electrical;
- Human factors; and
- Security

19.5.4 *§148.105(r)(5)(iv)* Firefighting Equipment

In regard to potential fires or gas releases, the layout and orientation of the West Delta DWP design was informed by the optimal layout for fire safety. The direction of the prevailing winds was used to optimize the facility orientation and separation of equipment and facilities, as established in Volume III, Attachment 17, "Fire Protection and Firefighting Philosophy," (*Confidential*).

Fire protection is established through a multi-stage approach, including preliminary fire system layout assessment, fire protection analysis, fire size and duration assessment, fire and gas detection layout design, and containment identification, as established in the Volume III, Attachment 16, "Fire and Gas Detection Philosophy," (*Confidential*), as well as water and foam demand calculations, and passive fire protection requirements. A firewater system would consist of one firewater pump per LNG production platform with a pumping capacity of 10,000 gallons per minute (37.9 m^3 per minute) each at a pressure of 175 psig (1.2 Mpa).

19.5.5 *§148.105(r)(5)(v)* Pollution Prevention Equipment

The draft NPDES permit application (see Volume I, Appendix C, "U.S. Environmental Protection Agency National Pollutant Discharge Elimination System Permit Application") describes how seawater would be used, treated, and discharged at the West Delta DWP. Main water discharges to sea would be handled by both an open drain system and a closed drain system.

The open drain system would be designed to collect deck drainage resulting from storm events. Hydrocarbons separated in the disposal equipment would be pumped to a storage tank, while water that is separated would meet applicable regulatory requirements and be discharged overboard. A solids handling unit would be located upstream of the disposal equipment. The closed drain system would collect all contaminants not authorized for ocean discharge. Liquid drains from tanks and LNG production equipment would be routed to the closed drain system. Additional information regarding seawater use and waste water

discharges is provided in Volume III, Attachment 15, "Water Discharge Estimates by Source," (*Confidential*).

The types of equipment with atmospheric emissions and that support West Delta DWP operations are listed in Table 1-20 of Volume IIa, Section 1, "Project Description, and Purpose and Need." Additionally, air emissions information is provided in Volume IIa, Appendix M, "Operational Emissions Calculations for Offshore Stationary Sources." Most combustion sources at the DWP would use liquefaction-ready natural gas or BOG. For diesel-driven equipment on the DWP, low sulfur diesel fuel (sulfur content of 15 parts per million weight or less) would be used (see Volume IIa, Section 11.6.1, "Air Quality"). Additional information on stationary emission sources is provided in Volume I, Appendix F, "U.S. Environmental Protection Agency Region 6 Prevention of Significant Deterioration Air Permit Application." A Title V Permit Application for the proposed DWP is included in Volume I, Appendix G, "Title V Permit Application."

Various chemicals, refrigerants, fuels, and lubricants would be stored on each of the platforms making up the West Delta DWP. Several types of these materials are stored on multiple platforms. Table 1-17 in Volume IIa, Section 1, "Project Description, and Purpose and Need," summarizes the chemicals and lubricants that would be stored at the DWP. A detailed list of chemical and lubricants that would be stored at the DWP is provided in Volume III, Attachment 14, "Utilities and Chemicals Consumption List," (*Confidential*).

19.5.6 *§148.105(r)(5)(vi)* Waste Treatment Equipment

Sanitary sewer treatment packages would be located on the LNG production, accommodations, and utilities platforms (see Volume IIa, Section 1, "Project Description, and Purpose and Need").

19.6 *§148.105(r)(6)* Cargo Pumping and Piping, Control and Instrumentation, and Associated Equipment

19.6.1 *§148.105(r)(6)(i)* Cargo Pumping Equipment

On the LNG storage platforms, each individual FSP tank would have one (1) submersible cryogenic pump (in-tank) for LNG loading, along with all the associated piping and instrumentation for pressure, temperature, and level control (see Volume I, Appendix A, "Figures," Figure 9). Each tank pump would be sized for a flow rate of 1,200 m^3/hr. Ten (10) in-tank pumps would be used during loading operations to meet a maximum transfer rate of 12,000 m^3/hr. The transfer rate is adjustable and would depend on the size of the LNG trading carrier calling on the West Delta DWP.

19.6.2 *§148.105(r)(6)(ii)* Cargo Piping System

A marine conventional loading arm system located on the LNG loading platform would be used to load LNG onto LNG trading carriers from the LNG loading platform (see Volume I, Appendix A, "Figures," Figure 12). The LNG loading system would have two (2) 16-inch (40.6-centimeter) diameter standard liquid arms (5,000 m^3/hr each); one (1) hybrid (liquid/vapor) 16-inch (40.6-centimeter) diameter arm (5,000 m^3/hr liquid service, 25,000 m^3/hr vapor service); and one (1) 16-inch (40.6-centimeter)

diameter standard vapor arm (25,000 m^3/hr) conditioned with a cool-down loop scheme and an emergency release system or quick disconnect system. All arms would be used to load LNG trading carriers with a 180,000-m^3 nominal capacity depending on manifold restrictions; two (2) liquid arms and one (1) vapor arm would be used to load the 30,000-m^3 nominal capacity LNG trading carriers.

19.6.3 §148.105(r)(6)(iii) Control and Instrumentation System

The main operator station and main control console on the utilities platform would provide control for cargo pumping and loading (see Volume I, Appendix A, "Figures," Figure 15). Remote operator stations would be located on storage platform #3 in the electrical room and on the loading platform. The main station and control console would include systems to control pumping and loading operations, provide for emergency shutdown, and monitor the fire and gas detection equipment for cargo pumping and loading. Communications among control system components would use redundant fiber optic cables. All controllers and power supplies would be redundant, but input/ output would not be redundant, except as required for safety systems.

LNG cargo transfer would be measured by volumetric gauging using radar gauges and float gauges in each LNG trading carrier's tanks for final custody transfer, with in-line flow measurement at the West Delta DWP via Coriolis mass flow meters or ultrasonic flow meters for backup LNG product metering. A flow meter downstream of each loading pump would be used to confirm the total rate of LNG product transferred. A flow totalizer that sums the LNG flowing to the LNG trading carrier would be installed on the loading platform as a final check of LNG loading transfer rate.

LNG storage inventory would be measured using level instrumentation on each individual LNG storage tank to validate the final custody transfer and in-line measurements. Metering would occur on the LNG recirculation lines (used to keep the lines cold) of the storage tanks.

19.6.4 §148.105(r)(6)(iv) Associated Equipment, including Power Supply, Leak Detection, Emergency Shutdown, and Alarm System

All electrical power for normal and essential electrical load would be supplied from distribution gear located within the electrical building on the utility platform (see Volume I, Appendix A, "Figures," Figure 15). Similarly, in the absence of main power, all instrumentation, navigational aids, public address/general alarm, egress lighting, and similar life safety equipment would be operated from the uninterrupted power supply system located in the same electrical building. The LNG loading pumps and the BOG blowers located on storage platform #3 would be powered from the utility platform. Only the power cables necessary to connect to the pump motors would be located on the storage platform. A small electrical and instrumentation building would be centrally located on storage platform #3, containing an uninterrupted power supply system and battery system for all safety equipment located on the storage platforms. Equipment would include storage and pumping instrumentation for all storage tanks, fire and gas detection systems, public address/general alarm, normal and egress lighting, emergency shutdown devices, navigational aids, and other small power users that may be present.

Temperature and pressure transmitters in the vacuum space of the vacuum jacketed piping used for the LNG product loading lines would provide leak detection. LNG product metering would not be used for leak detection.

Depending on the severity of an incident on one or more LNG storage platforms, the affected platform(s) would be shut in and isolated. The affected tank(s) would be prepared to transfer their inventory

to other storage tanks (if capacity is available). Liquefaction production would be reduced to accommodate the diminished storage capacity. If an incident occurs on the loading platform, the loading platform would be shut in. All shutdown valves on the loading lines would be closed. If an LNG trading carrier is present at the time, the facility would switch from loading to holding mode, the facility would take measures to secure the loading arms in a safe state, and the LNG trading carrier would prepare to depart. Liquefaction trains and equipment would remain operational until storage is near full capacity.

During an emergency situation, the auxiliary command room on the accommodations platform would serve as the command center. The general alarm system, a part of the public address/general alarm system, could be activated from either command center and would be used to alert persons onboard in case of an emergency.

19.7 §148.105(r)(7) Personnel Capacity of the Pumping Platform Complex

Accommodations at the West Delta DWP would be provided for operations and maintenance personnel and would consist of sleeping quarters, a galley, a laundry room and dining room, lounges, activity rooms, offices, meeting rooms, process monitoring, an auxiliary command room, embarkation and receipt of personnel, helideck for airship operations, change rooms, and HVAC systems, in combination, serving as a safe harbor for all personnel during emergency events for the normal marine and operations crew, as well as for additional personnel during planned maintenance turnarounds. The anticipated crew size is 32 people, but the accommodations platform would be designed to support up to 36 people to accommodate visiting personnel. There would be no living quarters at the Venice Pretreatment Plant.

20 §148.105(s) Refurbished OCS Facilities and Colocated Fixed Offshore Components

The proposed West Delta DWP would not utilize refurbished OCS facilities or components and, as such, none are included in this DPLA.

21 §148.105(t) Offshore Pipelines

21.1 §148.105(t)(1) Marine Pipelines Descriptions and Drawings

Liquefaction-ready gas would be supplied by the proposed Venice Pretreatment Plant and 30-inch (76.2-centimeter) diameter subsea pipeline that would terminate at the gas arrival platform of the West Delta DWP. The proposed offshore pipeline would be 15.5 statute miles (24.9 kilometers) long (or 19.8 statute miles [31.9 kilometers] when including both the onshore and offshore segments). The liquefaction-ready gas subsea pipeline would terminate at the top of the pipeline riser on the gas arrival platform. Table 7-2 in Section 7.2, "Subsea Pipeline from Onshore to the Platform," above, lists the lease blocks that the pipeline would traverse to reach the DWP. Figure 1 in Volume I, Appendix A, "Figures," and Figure 1 in Volume IIa, Appendix A, "Subsea Pipeline Charts," illustrate the location of the pipeline.

21.1.1 §148.105(t)(1)(i) Size

See Section 21.1, "§148.105(t)(1) Marine Pipelines Descriptions and Drawings," above.

21.1.2 §148.105(t)(1)(ii) Throughput Capacity

In the nominal design case,[7] the proposed Project would process approximately 750 MMscfd of feed natural gas for the proposed West Delta DWP. Based on an estimated production unit availability of 95.4 percent (see Volume III, Attachment 9, "West Delta DWP Basis of Design," [*Confidential*]) and an allowance for consumption of feed gas during the liquefaction process, the proposed DWP would nominally produce 5.0 MMtpa of LNG for export, or the equivalent of 250 billion standard cubic feet per year of LNG.

For the optimized case,[8] the proposed Project would process approximately 900 MMscfd of feed gas to produce approximately 6.1 MMtpa of LNG for export, or the equivalent of 306 billion standard cubic feet per year of LNG. Accordingly, the Applicant is requesting authorization under the DWPA to own, construct, and operate facilities capable of exporting an annual average of 6.1 MMtpa of LNG to FTA and non-FTA nations.

21.1.3 §148.105(t)(1)(iii) Length

See Section 21.1, "§148.105(t)(1) Marine Pipelines Descriptions and Drawings," above.

[7] The estimated production capacity for the "nominal design case" composition with an inlet gas pressure of 1,000 psig (6.99 MPa) and an ambient temperature of 70 °F (21.1 °C) is 5.0 MMtpa.

[8] The estimated production capacity for the "optimized case" with an inlet pressure of 1,000 psig (6.99 MPa) and an ambient temperature of 56°F (13.3°C) is 6.1 MMtpa.

21.1.4 §148.105(t)(1)(iv) Depth of Cover

As discussed above, all proposed offshore pipelines would be trenched/buried to a depth of cover of at least 3 feet (0.9 meter) BML and 10 feet (3 meters) of cover BML in fairways, in accordance with regulatory requirements.

21.1.5 §148.105(t)(1)(v) Protective Devices

Pipe wall thickness (hoop stress), shutoff valve spacing, and depth of cover would comply with the applicable requirements for the proposed pipeline. Hydrostatic testing of the pipeline would be performed to ensure the integrity of the installed pipelines (49 CFR 192 et seq.). The pipeline has corrosion and concrete coatings designed to protect the exterior surface of the pipeline.

21.2 §148.105(t)(2) Marine Pipelines Design Criteria

Volume I, Appendix D, "Summarized Basis of Design," includes the basis of design, which provides design criteria for West Delta LNG Project components, including pipelines.

21.3 §148.105(t)(3)Marine Pipelines Design Standards and Codes

Volume I, Appendix D, "Summarized Basis of Design," includes the basis of design, which provides design standards and codes for West Delta LNG Project components, including pipelines (see Table 19-1, above).

21.4 §148.105(t)(4) Marine Pipelines Engineering Practices

Volume I, Appendix D, "Summarized Basis of Design," includes the basis of design, which provides engineering practices for West Delta LNG Project components, including pipelines.

21.5 §148.105(t)(5) Marine Pipelines Metering System

The feed gas would be metered for quality and volume utilizing a gas chromatograph system located at the Venice Pretreatment Plant to ensure that gas from the Venice Pretreatment Plant meets the feed gas specification (see the "Feed Gas Specification," included as part of Volume III, Attachment 9, "West Delta DWP Basis of Design," [*Confidential*]). A gas chromatograph check meter would be installed at the gas arrival platform at the West Delta DWP (see Volume I, Appendix A, "Figures," Figure 5).

21.6 §148.105(t)(6) Submerged or Buried Pipelines Crossed by Marine Pipelines

The offshore pipeline would cross four existing, active pipelines. The details of the crossing would be agreed upon by the owners of the pipelines and cables to be crossed. The new offshore pipeline would maintain an 18-inch (45.7-centimeter) vertical separation from the existing lines.

21.7 §148.105(t)(7) Pipelines Transporting Product and Connected to the Port

The proposed offshore pipeline would transport liquefaction-ready gas from the proposed onshore Venice Pretreatment Plant to the proposed offshore West Delta DWP. The proposed offshore pipeline would be the only pipeline transporting product that is connected to the DWP.

22 §148.105(u) Onshore Components

22.1 §148.105(u)(1) Description of Onshore Facilities

22.1.1 Venice Pretreatment Plant

The proposed Venice Pretreatment Plant would be located on an existing 121-acre (49-hectare) onshore natural gas processing facility in Plaquemines Parish, Louisiana, and the Applicant would propose to sublease space within the Venice Gas Complex to install the equipment needed for the proposed natural gas processing and compression facility. The Venice Pretreatment Plant would receive natural gas from offshore Gulf of Mexico midstream pipelines and/or interstate pipeline feed gas from pipelines already interconnected with the Venice Gas Complex. By combining the cryogenic process residue gas with interstate pipeline gas into a gathered feed supply gas Applicant would then pretreat the gathered feed supply by the new pretreatment equipment to a "ready-to-liquefy" specification before being sent to the West Delta DWP via new gas compression and a proposed 30-inch (76.2-centimeter) pipeline. To accomplish the necessary objectives, the proposed Venice Pretreatment Plant would contain the following major components for the pre-treatment and processing of sourced natural gas.

- **Cryogenic Trains.** Two (2) existing cryogenic trains: one train sized to process up to 300 MMscfd, and a second train sized to process up to 450 MMscfd. These trains process offshore-sourced gas to extract liquefied petroleum gas products, which is pumped to an existing liquefied petroleum gas export pipeline. Residue gas (after extraction) is compressed into the interstate pipeline system. For the West Delta DWP, the residue gas flow would be redirected and blended with additional interstate pipeline gas, pretreated, and sent to the DWP.

- **Natural Gas Inlet Compressors**. Three (3) new Solar Centaur 40 natural gas inlet compressors (3x50%) driven by gas turbines (total 7,000 horsepower) to deliver up to 600 MMscfd of interstate pipeline feed gas at a delivery pressure of 1,000 psig (6.99 Mpa). Gas supplied by these compressors would supplement the residue gas from the existing cryogenic trains. The blended gas would then enter the gas pretreatment packages.

- **Gas Pretreatment Packages**: Four (4) new engineered modular prefabricated gas pretreatment trains would provide the 800 MMscfd to 1,200 MMscfd of liquefaction-ready gas to the West Delta DWP. Each pretreatment train would process 200 to 300 MMscfd to meet the BHGE liquefaction-ready feed gas specification using residue gas from the existing cryogenic trains blended with interstate pipeline natural gas. The natural gas pretreatment packages would consist of mercury removal units, acid gas removal units, dehydration units, and heavy hydrocarbon removal units. Mercury would be removed from the blended feed gas stream to protect liquefaction equipment. The acid gas removal units would remove carbon dioxide and hydrogen sulfide using a conventional amine solvent. These compounds must be removed to prevent freezing during the liquefaction process. The amine solvent would be regenerated using heat from the waste heat recovery units on the gas turbines at the facility. The acid waste gas removed from the amine solvent during the regeneration process would be sent to a flare. Dehydration would use molecular sieve beds contained in adsorber vessels to remove water from the saturated treated gas exiting the acid gas removal unit. Thermal regeneration would be used to desorb water from the molecular sieve beds. Two (2) beds would be in operation

while the third bed undergoes regeneration. Heat for the thermal regeneration would be supplied by the waste heat recovery units on the gas turbines driving electrical power generators at the facility. Heavy hydrocarbons would be removed from the relatively lean feed gas using thermal regeneration to desorb heavy hydrocarbons.

- **Liquefaction-Ready Gas Compressors**. Three (3) new Solar Taurus 60 natural gas compressors (3x50%) driven by gas turbines (total of 11,200 horsepower) to deliver 750 to 900 MMscfd of liquefaction-ready gas to the West Delta DWP at a 1,000 psig (6.99 Mpa) arrival pressure offshore.

- **Power Generation**. Three (3) new Solar Mars 100 power generation units (3x50%) driven by gas turbines to deliver a total of 27 MW (9 MW each) would be needed to operate the gas pretreatment trains. Each gas turbine would be equipped with waste heat recovery.

- **Waste Heat Recovery/Hot Oil System**. Waste heat recovery units would be installed on the electrical power generation gas turbines to heat circulating thermal oil for process heating. Users of process heat in the pretreatment trains would include regeneration of the amine solvent in the acid gas removal units, desorption of water from the molecular sieve dehydration beds, and the heavy hydrocarbon adsorbers.

- **Utilities**. A fuel gas system of 20 MMscfd capacity, a nitrogen generation system, a demineralized water generation system, and compressed air equipment would be installed to support the new gas pretreatment and compression equipment.

- **Flare**. A flare would be installed to combust waste gas from the pretreatment process. This flare would have a continuously lit pilot light and have a design capacity of 1,000 MMscfd.

The design life of the Venice Pretreatment Plant when built would be 30 years. Availability of the facility for the Project would align with the requirements of the West Delta DWP—at a minimum, the weighted equivalent of 350 days per year operating at design capacity on a 24-hour/7-day-per-week schedule.

22.1.2 Onshore Pipeline

Liquefaction-ready gas would be supplied from the proposed Venice Pretreatment Plant and a proposed 30-inch (76.2-centimeter) pipeline terminating at the proposed West Delta DWP (see Volume I, Appendix A, “Figures,” Figure 1). This pipeline would total, 19.8 statute miles (31.9 kilometers) in length, with 4.3 statute miles (6.9 kilometers) onshore in Louisiana (measured from the proposed pig launcher to the high water mark) and 15.5 statute miles (24.9 kilometers) offshore in the Gulf of Mexico.

22.1.3 30-inch In-field Pipeline Header

The proposed 30-inch (76.2-centimeter) in-field pipeline header would be an approximately 0.9-statute-mile (1.4-kilometer) long discharge header connecting the Venice Pretreatment Plant export compressors with the proposed pipeline launcher assembly and pipeline via (HDD (Volume I, Appendix A, "Figures," Figure 20). All HDD staging for drill entry and exit would be located within the existing Venice Gas Complex. The proposed 30-inch (76.2-centimeter) pipeline launcher assembly would be located away from the routinely manned Venice Pretreatment Plant for segregation safety purposes. There would be a new pigging and valve station installed at the pig launcher assembly location providing access to the proposed 30-inch (76.2-centimeter) onshore pipeline. A new gas metering station for the proposed 30-inch (76.2-centimeter) onshore pipeline would also be located at the pig launcher assembly location. These new components would be installed within the existing Venice Gas Complex; therefore, no new undisturbed land would be required for the Project.

22.2 *§148.105(u)(2)* Chart of Planned and Existing Facilities to be Served by Port

The West Delta DWP and associated pipelines are illustrated in Figure 1 in Volume I, Appendix A, "Figures," as well as Figure 1, Volume IIa, Appendix A, "Subsea Pipeline Charts." The primary purpose of the Project would be to provide a safe and reliable facility to export domestically produced LNG to both FTA and non-FTA nations. Therefore, it is not intended that any planned or existing U.S. onshore facilities or refineries would be served by the Project.

22.3 *§148.105(u)(3)* Proposals and Agreements

The primary purpose of the proposed Project would be to provide a safe and reliable facility to export domestically produced LNG to FTA and to non-FTA nations. Therefore, it is not intended that any planned or existing U.S. onshore facilities or refineries would receive LNG transported from the Project, and no proposals or agreements with existing or proposed refineries in the United States exist. West Delta LNG, LLC has engaged in discussions with potential international LNG customers. Copies of agreements with potential customers are provided in Volume IV, Attachment B.5 (*Confidential*).

23 §148.105(v) Miscellaneous Components

This section of the application provides information on miscellaneous components associated with the West Delta DWP.

23.1 §148.105(v)(1) Radio Station and Communications Systems

A marine information station within the West Delta DWP control room on the utilities platform would monitor weather conditions, vessels approaching and/or operating in the vicinity of the DWP, and mooring line tension of the LNG trading carrier at the berth. Suitable communications equipment would be provided to maintain constant contact with and monitor the approaching and departing LNG trading carriers, other marine vessels, and helicopters. An operator would advise the incoming LNG trading carrier of current weather conditions, berthing arrangements, pilotage, and applicable USCG/U.S. government regulations. A duplicate communications and readout capability would be available within the accommodations platform to support operations with LNG trading carriers, as needed, and during DWP up-manning or down-manning events, such as hurricane response.

23.2 §148.105(v)(2) Radar Navigation System

At least two (2) radars with automatic identification system (AIS) capability, one short range and one long range, would be installed to clearly view the area around the West Delta DWP. In addition, a redundant radar transponder beacon (RACON) would be installed and, when triggered by a ship's radar, would transmit a distinctive signal that would appear on the display of the triggering radar, providing range, bearing, and identification information. The short-range radar would be capable of covering the medium to short ranges, from 12 statute miles (19.3 kilometers) down to 1 statute mile (1.6 kilometers). This radar would monitor all vessels operating and/or transiting in the vicinity of the DWP. This unit would operate continuously and monitor any potentially suspicious vessels that may enter the DWP security zone. The unit would also monitor all marine traffic in the area, advising, as necessary, the approaching or departing LNG trading carriers for berthing or anchoring. The long-range radar would be capable of covering the long to medium ranges, from 30 statute miles (48.3 kilometers) down to 12 statute miles (19.3 kilometers). This radar would monitor all marine vessels within a 30-statute-mile (48.3-kilometer) radius and advise the approaching or departing LNG trading carriers of other marine traffic and deviations from the navigational routes to the DWP. The displays of each radar would be overlaid with the security zone, approach corridor, and anchorages. This would enable the operators to monitor the progress of approaching vessels and to assist, as required, with navigation information, particularly in cases of reduced visibility.

23.3 §148.105(v)(3) Vessel Bunkering Methods

Bunkering or resupply of LNG trading carriers, other marine vessels, and helicopters would not be allowed at the West Delta DWP.

23.4 §148.105(v)(4) Vessels for Bunkering, Mooring, and Servicing Vessels Using the Deepwater Port

Support vessels for the West Delta DWP platform would include crew boat/supply boat runs for personnel and consumables transport. Additional information on support vessels is provided in Volume IIa, Section 1 "Project Description, Purpose and Need."

There would be three (3) vessel types available to assist in operation of the West Delta DWP:

- Four (4) tug boats for escorting, berthing, and unberthing the LNG trading carriers;
- Supply boats to deliver necessary supplies (i.e., food and other accommodations needs, chemicals, consumables) and personnel; and
- Maintenance vessels (e.g., lift boats, work boats), which may be required periodically for work at the West Delta DWP.

23.5 §148.105(v)(5) Shore-Based Support Facilities Operations Management

The West Delta DWP onshore operations office would be located at the Cox Operating shore base in Grand Isle, Louisiana, and employ 12 full-time personnel that would work regular office hours and be on-call during weekends, as needed. The Venice Pretreatment Plant would employ eight people working 2-week rotations on a 24-hour schedule.

23.6 §148.105(v)(6) Radio Station License

The West Delta DWP would utilize Cox Operating's existing communication systems, such as shore-based communications—microwave communications, hand-held radios (UHF/VHF), cellular, satellite, and internet-based communications. To the extent necessary for the proposed DWP, a copy of a radio station license to the Federal Communications Commission will be provided to MARAD and USCG once available.

24 §148.105(w) Construction Procedures

The term "construction," as used in this section, includes all phases of Project development, except Project planning, detailed engineering design, and offsite construction of the West Delta DWP modules, jackets, and piles. The phrase "construction" is used interchangeably with "installation" and is synonymous with it. The following subsections provide the construction procedures for the offshore and onshore components of the proposed Project.

24.1 Pre-Construction Surveys

An archaeological resources survey was commissioned by West Delta LNG, LLC to investigate potential effects of the Project on any archaeological resources in the area of potential effect (APE) and to obtain the required data as input to prepare the archaeological resources survey report. The survey and analysis of the data were performed in accordance with and comply with NTL 2005-G07 for Archaeological Surveys and Reports, which requires the archaeological assessment to be prepared and signed by a professional archaeologist, as defined in 36 CFR 61. An archaeological assessment report has been prepared by Fugro for the Proposed West Delta DWP (see Volume III, Attachment 2, "Shallow Hazards and Archaeological Assessment Surveys for the Deepwater Port," [*Confidential*]) and for the proposed pipeline (see Volume III, Attachment 3, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," [*Confidential*]).

The shallow hazards survey was conducted for the same area as the archaeological resources survey. The shallow hazards survey was performed in accordance with guidance and requirements provided in the latest BOEM specifications for shallow hazard assessments detailed in publication NTL 2008-G05 (extended by NTL 2015-N02) for shallow drilling hazards. A shallow hazards survey report has been prepared by Fugro for West Delta Lease Blocks 44 and 45 and Grand Isle Lease Block 20 (provided in Volume III, Attachment 2, "Shallow Hazards and Archaeological Assessment Surveys for the Deepwater Port," [*Confidential*]) and for the proposed pipeline (provided in Volume III, Attachment 3, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," [*Confidential*]).

In addition, a bathymetric survey was prepared for each separate geophysical survey area evaluated, and raw depth data are provided by Fugro for West Delta Lease Blocks 44 and 45 and for Grand Isle Lease Block 20, as well as the proposed pipeline route (see Volume III, Attachment 2, "Shallow Hazards and Archaeological Assessment Surveys for the Deepwater Port," and Volume III, Attachment 3, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," [both *Confidential*], respectively).

Pre-construction activities conducted for the Project's onshore components include surveying and staking to delineate the centerline, workspaces, and aboveground facility locations, subject to landowner consent. These activities are essential to identifying the outside limits of the right-of-way, the centerline location of the pipeline, foreign utility crossings, and additional temporary workspace, such as spoil stockpile areas for the pipeline trench or dredging material. Underground utilities (e.g., cables, conduits, and pipelines) would be located and flagged.

24.2 Offshore Project Components

24.2.1 Subsea Pipeline Construction

The construction and installation of the subsea pipeline would be completed by three different methods of pipeline construction, including HDD, dredge lay barge, and offshore lay barge (see Volume I, Appendix A, "Figures," Figure 20). HDD and dredge lay barge methods are described in Volume IIb, Section 24.3.1.1, "Special Pipeline Construction Methods." Offshore lay barge method is described in the following subsection.

24.2.1.1 Offshore Lay Barge

The subsea pipeline would be installed using a conventional, anchored, offshore pipeline installation barge with work stations for pipe welding, weld inspection, and field joint application. Offshore lay barge pipeline installation begins with the positioning the offshore pipeline installation barge at the end of the dredge lay barge pipeline section. Anchor handling tugs would position the barge, and the barge would set anchors along the pipeline right-of-way using two (2) stern anchors, a minimum of two (2) bow anchors, and four (4) breast anchors. The barge would use a winch to retrieve the pipeline end from the seafloor and position it onto the barge in order to begin welding and stringing the new pipeline. During the assembly of each new joint of pipe, the barge would be moved forward by tightening the bow anchor cables and slacking the stern anchor cables while deploying the assembled pipeline from the barge. When the last joint of pipe has been assembled, the pipe would be lowered to the seafloor in the designated "target box" near the jacket of the gas arrival platform and welded on the gas arrival riser pipe.

Upon completion of pipeline installation, a trenching vessel would begin at the point of the offshore lay barge and would deploy a jet sled (or similar pipe burial sled) from an A-frame located at the stern of the vessel. As the trenching vessel and jet sled move down the pipeline, high-pressure water jets would break up the consolidated bottom materials alongside and underneath the pipeline, and high-pressure compressed air would be used to remove the slurry beneath the pipe. As the pipeline "falls" into this trench created by the jet sled, sediments would fill in behind it and provide the required cover. Following the installation and trenching of the pipeline, an inspection would be conducted to ensure that 3 feet (0.9 meter) of cover BML was achieved.

When crossing any active existing pipelines and cables, the new pipeline would be installed below the existing pipelines and cables using HDD. All pipeline and cable crossings would maintain a minimum of 18 inches (45.7 centimeters) vertical separation.

24.2.2 Deepwater Port Construction – Pre-Fabrication of Major Deepwater Port Components

It is anticipated that all fabrication of the platform deck modules would occur in China using various fabrication contractors, including China Offshore Oil Engineering Co., Ltd. (COOEC), Shanghai Honghua Offshore Oil & Gas Equipment Company, Ltd., and others. Platform jackets and piles fabrication would occur in China. All onshore fabrication work would be completed in existing fabrication facilities.

Project transportation would consist of a combination of self-propelled, self-ballasting transport ships for the different platforms and terminal structures. Due to weight and size, the larger West Delta DWP decks (i.e., LNG production, LNG storage, and utilities) would be transported on self-propelled, self-ballasting, heavy transport vessels and delivered directly to the site for floatover installation. All other structures would be transported on self-propelled, self-ballasting transport ships and delivered directly to

the offshore site for installation using cranes mounted on derrick barges. Table 24-1 lists the transportation methods for the DWP components.

Table 24-1
Transportation Methods for West Delta Deepwater Port Components

Description	Vessel Type	Route	
		Panama Canal	Cape of Good Hope
Liquefied Natural Gas (LNG) Production Jackets, Piles	Transport Ship	X	
LNG Production Decks	Floatover Vessel		X
LNG Storage Jackets, Piles	Transport Ship	X	
LNG Storage Decks	Floatover Vessel		X
Gas Arrival Jacket, Piles	Transport Ship	X	
Gas Arrival Deck	Transport Ship	X	
Utilities Jacket, Piles	Transport Ship	X	
Utilities Deck	Floatover Vessel	X	
LNG Loading Jacket, Piles	Transport Ship	X	
LNG Loading Deck	Transport Ship	X	
Flare Jacket, Piles	Transport Ship	X	
Flare Deck	Transport Ship	X	
Accommodations Jacket, Piles, Boat Landing	Transport Ship	X	
Accommodations Deck	Transport Ship	X	
Accommodations Module	Transport Ship	X	
Mooring/Breasting Dolphins Decks, Jackets, Piles	Transport Ship	X	
Platform Connecting Bridges	Transport Ship	X	

24.2.3 Installation Procedures for the Deepwater Port Components

At the onset of the installation of the West Delta DWP, jackets would be placed on the seabed and all necessary piles would be driven to designed depths utilizing a conventional impact hammer on a derrick barge. Conventional impact hammers rely on the impact force (weight and height) of the hammer device to drive piles and can reach soil penetration depths of more than 250 feet (76.2 meters). This hammering technique helps retain high soil-bearing capacity and friction to the outer surface of the piles to support the loads of each platform.

Two types of installation vessels would then be used to install each component for the West Delta DWP to the driven piles:

- Type 1 – Self-propelled, self-ballasting, heavy transport vessel (floatover); and
- Type 2 – Derrick barge with a full range swing derrick crane on spread moor anchors.

Installation vessels currently in the Gulf of Mexico would be utilized. Table 24-2 shows the installation method for each West Delta DWP component.

Table 24-2
Installation Methods for West Delta Deepwater Port Components

Platform Component	Installation Method
Liquefied Natural Gas (LNG) Production Jacket, Piles	Derrick Barge
LNG Production Deck	Floatover
LNG Storage Jacket, Piles	Derrick Barge
LNG Storage Deck	Floatover
Gas Arrival Jacket, Piles, Boat Landing	Derrick Barge
Gas Arrival Deck	Derrick Barge
Utilities Jacket, Piles	Derrick Barge
Utilities Deck	Floatover
LNG Loading Jacket, Piles, Fender	Derrick Barge
LNG Loading Deck	Derrick Barge
Flare Jacket, Piles	Derrick Barge
Flare Deck	Derrick Barge
Accommodations Jacket, Piles, Boat Landing	Derrick Barge
Accommodations Deck	Derrick Barge
Accommodations Module	Derrick Barge
Mooring/Breasting Dolphins Decks, Jackets, Piles	Derrick Barge
Platform Connecting Bridges	Derrick Barge

Installation planning would account for the optimal offshore construction period, transportation constraints (weather), and transit route restrictions while closely following the construction sequence. A preliminary installation sequence is provided in Table 24-3.

Table 24-3
Installation Sequence for the West Delta Deepwater Port

Order	Component	Installation Method
1	Utilities Jacket	Derrick Barge
2	Liquefied Natural Gas (LNG) Production Jackets 1-6	Derrick Barge
3	LNG Storage Jackets 1-6	Derrick Barge
4	Gas Arrival Jacket	Derrick Barge
5	Utilities Deck	Floatover
6	LNG Storage Decks 1-5	Floatover
7	LNG Production Decks 1-3	Floatover
8	Bridge from LNG Storage to Utilities	Derrick Barge
9	Bridge from LNG Production to Utilities	Derrick Barge
10	Gas Arrival Deck	Derrick Barge
11	Flare Platform (deck, jacket, flare tower, bridge)	Derrick Barge
12	Accommodations Platform (all)	Derrick Barge
13	Loading Platform (all)	Derrick Barge
14	Mooring/Breasting Dolphins (all)	Derrick Barge

24.2.4 Commissioning and Startup

An overall commissioning and startup plan would be developed during the detailed design phase of the West Delta DWP. A general design premise is to minimize onsite offshore construction, commissioning, and startup work. All topsides equipment and piping systems would be modular in design. Modules and skid packages would be complete, with all piping, coatings, insulation, instrumentation, and wiring to the fullest extent possible and practical, and pre-commissioned at the fabrication yards prior to ocean transport. Engineered skid packages would be designed to be shipped by ocean transport for deck integration.

Upon field installation, commissioning and startup activities would prioritize utilities and safety systems. All utilities and safety systems must be fully commissioned and functional before the introduction of any hydrocarbons.

Commissioning and startup of the cryogenic equipment would follow the vendor's cooling procedures to ensure integrity of the systems. All cryogenic equipment would be purged to remove moisture and oxygen. A cooldown analysis would be conducted during the detailed design phase to define the cooldown method for the FSP tanks and loading arm systems. This analysis involves comparing cooldown using LNG produced in the facility and cooldown using LNG imported via LNG trading carriers. Limited flaring of the vaporized LNG used during cooldown would occur until the facility fuel gas demand is sufficient to reuse the vaporized LNG in the gas turbine equipment.

24.3 Onshore Project Components

24.3.1 Pipeline Construction

The construction and operation of the proposed onshore pipeline would require acquisition of temporary right-of-way and operational easements. Three installation methods would be used during construction of the onshore pipeline and the 30-inch (76.2-centimeter) in-field pipeline header—HDD lay, dredge lay barge, and push/pull lay—which are discussed in Section 24.3.1.1, "Special Pipeline Construction Methods," below. Table 24-4 summarizes right-of-way widths in each typical installation method. Table 24-5 summarizes proposed construction techniques by section length for the onshore pipeline.

Table 24-4
Typical Onshore Pipeline Right-of-Way Widths and Project Length Per Construction Methods

Onshore Pipeline Installation Method	Construction Right-of-Way Width[1] (feet [meters])	Operational Right-of-Way Width (feet [meters])	Permanently Maintained Right-of-Way Width (feet [meters])
Push/Pull Lay	300 (91.4)	50 (15.2)	50 (15.2)
Dredge Lay Barge	300 (91.4)	50 (15.2)	50 (15.2)
HDD Lay	50 (15.2)	50 (15.2)	0 (0)

Note:
[1] Includes additional temporary workspace for HDD drill equipment.
Key:
HDD = horizontal directional drill

Table 24-5
Pipeline Construction Lengths

Installation Method	Total Statute Miles (kilometers)
30-inch (76.2-centimeter) In-field Pipeline Header	
HDD #1	1.0 (1.6)
Onshore Pipeline Interconnect	
HDD #2	1.0 (1.6)
Push/Pull Lay	2.8 (4.5)
Dredge Lay Barge	1.1 (1.8)
HDD #3	0.4 (0.6)

Key:
HDD = horizontal directional drill

24.3.1.1 Special Pipeline Construction Methods

Onshore pipeline construction in the proposed Project area cannot be accomplished using conventional means and, thus, would require special construction methods specialized for unconsolidated wetlands and open water. For the West Delta LNG Project, it is anticipated that the following special construction procedures would be required, as discussed below:

- HDD;
- Dredge lay barge construction; and
- Push/pull construction.

Horizontal Direction Drill

The HDD method is a trenchless method for installing underground pipe and is used to avoid direct impacts on sensitive resources (e.g., waterbodies, wetlands) or infrastructure (e.g., major roads, railroads). This method entails drilling relatively deep beneath the surface features on a curved path. It requires specialized equipment and personnel and comprises four general steps:

1. Placement of guide wires over the anticipated path of the drill;

2. Drilling a pilot hole on an arc-shaped path that typically extends between 30 and 50 feet (9.1 to 15.2 meters) beneath the waterbody or other sensitive feature;

3. Enlarging the pilot hole with a series of reamers to accommodate the pipeline; and

4. Pulling a pre-fabricated section of pipe through the hole.

The HDD method involves an entry and exit pad on each side of the crossing. The initial step of placing HDD guide wires over the path of the drill may require clearing. A pilot hole is drilled under the feature. The head of the pilot drill string contains a pivoting head that can be controlled by an operator as the drill progresses. Typically, the pilot hole would be directed downward at an angle until the proper depth is achieved, then turned and directed horizontally for the required distance, and finally angled upward back to the surface. Throughout the process of drilling and enlarging the hole, drilling mud, consisting of bentonite and water, is pressurized and pumped through the drill stem to lubricate the drill bit, maintain the hole, and remove drill cuttings. Bentonite is the commercial name for a nontoxic mixture of naturally occurring clays and rock particles. This drilling mud has the potential to be inadvertently released to the surface if fractures or fissures are encountered in the substrate during drilling.

The potential for an inadvertent release is generally greatest during drilling of the pilot hole, when the pressurized drilling mud is seeking the path of least resistance, and near the drill entry or exit pits, where the drills are at their shallowest depths. The path of least resistance is typically back along the path of the drilled pilot hole. However, if the drill path becomes temporarily blocked or encounters areas such as large fractures or fissures that lead to the ground, then an inadvertent release could occur. West Delta LNG, LLC has developed HDD profiles and plans for crossings of Section 10 waterways for USACE permitting (a copy of the USACE permit draft application is included in Volume I, Appendix B, "U.S. Army Corps of Engineers/Louisiana Department of Natural Resources Joint Permit Application for Work within the Coastal Zone"). In addition, an HDD contingency plan to monitor for, contain, and clean up any inadvertent releases of drilling fluid is included in Volume IIb, Appendix D, "Horizontal Directional Drill Contingency Plan."

Dredge Lay Barge Construction

Dredge lay barge construction would be required for pipeline sections located in open water or channels. Dredge lay barge construction is the most practical installation method for the Project, given the open water and/or channel depths on the pipeline route, and would minimize impacts on marshlands surrounding the deeper areas by eliminating the need for land-based equipment and fill. In open waters, the pipeline would be installed using shallow draft spud barges. The use of spud barges in open waters would require the excavation of a flotation channel within a 300-foot (91.4-meter) wide construction right-of-way. Using barges with anchor spuds eliminates the need for an anchor spread and anchor-handling boats, thus minimizing the area affected by construction operations.

The right-of-way centerline and boundaries would be staked with poles or floating buoys ahead of excavation. The pipeline trench would be excavated using a barge-mounted clam-bucket (or equal) dredge. With a draft of up to 7 feet (2.1 meters), the dredge lay barge would need water depths greater than 8 feet (2.4 meters) to allow unimpeded access through existing navigation channels to and along the right-of-way. In locations where the water depth is less than 8 feet (2.4 meters), some substrate excavation would be necessary to create deeper water. Within the construction right-of way, it is anticipated that the dredge lay barge would first excavate the flotation channel (where necessary) and then excavate the pipe trench along the bottom of the flotation channel. The dredge lay barge would cast the flotation channel and pipe trench spoil to either side of the right-of way centerline, keeping the spoil below the water surface, where feasible, to minimize wave-generated turbidity. The spoil would be placed parallel to the trench in 500-foot (152.4-meter) long piles, with 50-foot (15.2-meter) wide openings to allow the passage of local watercraft.

To ensure the safety of the boating public, the spoil piles and openings would be marked with warning signs and navigation lights. Surveyors would ensure that the dredge lay barge remains on the approved centerline, verify that the spoil remains within the 300-foot (91.4-meter) wide construction right-of-way, and confirm that the bottom of the pipe trench is at the designed depth. The pipeline would be fabricated aboard a string of shallow-draft spud barges connected together in a line to form the lay barge. The pipe would first be offloaded from tugboat-towed supply barges using a crane mounted on the lead barge. Each pipe joint would then be aligned end-to-end with the previous joint on a set of rollers extending the length of the lay barge. The pipe joints would be assembled into one continuous pipeline by passing through multiple welding, inspection, repair, and coating stations. All welders and the welding procedure would be qualified according to applicable American National Standards Institute, American Society of Mechanical Engineers, and American Petroleum Institute standards. To ensure that the assembled pipe would meet or exceed the design strength requirements, the welds would be visually inspected and examined using radiography (X-ray), ultrasound, or other approved methods, in accordance with American Society of Mechanical Engineers standards. Welds displaying unacceptable slag inclusions, void spaces, or other defects would be repaired or cut out and rewelded.

Once each weld has passed inspection and received its final coating, the pipe would be lowered off the back end of the lay barge into the pipe trench by lifting the anchor spuds of the lay barge and moving the lay barge forward the length of one pipe joint. The next pipe joint would be rolled into position for welding and the process would be repeated.

Following lowering in, surveyors would confirm that the pipe is at sufficient depth to provide the depth of soil cover required by the U.S. Department of Transportation or by permit condition. If the minimum cover is not achieved, the pipe would be lowered farther using a barge-mounted hydraulic jetting system. Once sufficient depth of the pipe is achieved to provide the minimum soil cover, the dredge lay barge would return to backfill the pipe trench and flotation channel, using the available spoil adjacent to the excavation. Using the clam bucket, the bottom would be restored to within 1 foot (0.3 meter) of the original elevation contours. Surveyors would confirm that final grade and tolerance have been achieved. Where the 1-foot (0.3-meter) grade tolerance is not achieved, a board or joint of pipe would be mounted on the dredge line and dragged across the bottom to remove high spots, until the contours have been restored to within the allowable tolerance. Where insufficient spoil remains to completely backfill the trench and channel to within 1 foot (0.3 meter) of original contours, due to erosion of the spoil piles and suspension of solids in the water column during handling, the trench and channel would be allowed to fill naturally with sediments over time.

Push/Pull Construction

For push/pull construction, a 130-foot (39.6-meter) wide construction right-of-way would be needed to allow temporary spoil storage on both sides of the trench. It is anticipated that the ditch width would be a minimum of 30 feet at the top, due to the poorly cohesive soils within the pipeline construction workspace. This width is based on the 10-foot minimum depth of ditch necessary for the installation of the 30-inch (76.2-centimeter) diameter concrete-coated pipe and ditch side slopes of 1:1. Trench spoil bank heights are anticipated to be relatively low because the excavated material lacks adequate unconfined compressive strength. To accommodate the trench spoil placement storage, it is anticipated that two spoil banks parallel to the push ditch would be needed. A 50-foot (15.2-meter) wide area would be required on both sides of the push ditch for spoil banks, equipment travel, and reasonable buffer gaps. Thus, the push/pull construction technique would require a 130-foot (39.6-meter) wide construction right-of-way, due to the combination of the 30-foot (9.1-meter) wide push ditch and the two 50-foot (15.2-meter) wide areas for spoil banks, equipment travel, and reasonable buffer gaps between the edges of the right-of-way, spoil banks, and ditch. This construction right-of-way width would reduce storage pile height and prevent material from re-entering the trench prior to placement of the concrete-coated pipe. Equipment on the construction right-of-way would be minimized and, when used, would be of the type having the least environmental impact in any given conditions. This equipment includes mats, marsh buggies, airboats, amphibious equipment, tracked equipment, and barges. The contractor would use discretion in choosing the equipment that would create the least ground pressure for the specific application. Construction would be performed in full accordance with the Project-specific best management practices and applicable permit requirements.

During construction preparation, suitable “push sites” would be identified that have all-weather access and are preferably on higher ground. Push sites in open water areas would consist of several shallow-draft spud barges connected together to provide a working platform. Using barges with anchor spuds eliminates the need for an anchor spread and anchor-handling boats, minimizing the area affected by construction operations. At the push site, various pipeline operations would take place, including pipe make-up, welding, non-destructive testing, joint coating and coating repairs, and installation of floatation apparatus.

Once the push sites are established, the right-of-way work can begin. The clearing equipment (amphibious or tracked) would be selected to prepare the right-of-way for the pipe. Where there is standing

water, only enough clearing and trenching would be done to accommodate installation of the pipe. Each excavator used would have a lateral reach sufficient to place spoil within the 130-foot (39.6-meter) wide construction right-of-way.

The joints of pipe, which are typically concrete-coated and 40 feet (12.2 meters) in length, would be transported as needed by barge from the pipe staging area to the push sites. At the push sites, after the pipe joints are welded together, the weld joints coated, and the floats attached, the pipe string would be floated out into the cleared right-of-way as part of the pipeline push operation. If necessary, a cable would be attached to the front of the pipe string and pulled from the other end of the right-of-way section to assist the push operation. The floats would be removed and would then be pipe-lowered into the trench. Trench backfilling would begin once the pipe is in place. No soils or fill would be imported from outside the workspace.

24.3.1.2 Hydrostatic Testing

Hydrostatic test water would be obtained from the open waters of the Gulf of Mexico along the offshore portion of the pipeline route or via municipal sources. Water used for the pipeline's hydrostatic testing would be cascaded (transferred) down the onshore pipeline for reuse as necessary. Test water would be discharged through energy-dissipating devices in accordance with the requirements of the Louisiana Pollutant Discharge Elimination System hydrostatic discharge general permit and using methods described in the construction best management practices (see Volume IIb, Appendix C, "Onshore Pipeline Construction Best Management Practices." Test water would contact only new pipe; therefore, no treatment of the hydrostatic test water is anticipated.

24.3.1.3 Cleanup and Restoration

After the pipeline has been installed, backfilled, and successfully tested, the right-of-way, additional temporary workspace, and other disturbed areas would be finish-graded and the construction debris properly removed and disposed of in accordance with local ordinances. Original land contours would be restored to conform to adjacent areas. Permanent erosion and sediment control measures, including slope breakers, trench breakers, and revegetation, would be installed. Disturbed areas would be seeded in accordance with written recommendations for seed mixes, rates, and dates obtained from the local soil conservation authority or as requested by the landowner. Private and public property, such as fences, gates, driveways, and roads that have been disturbed by pipeline construction would be restored to original or better condition.

25 §148.105(x) Operations Manual

A table of contents for the proposed West Delta DWP's OPMAN is included in Volume III, Attachment 24, "Operations Manual with Security Plan," (*Confidential*). The Port Operations Manual with Security Plan will be prepared prior to commencing operations and will be a living document that will be updated periodically during design and as construction and operations of the DWP proceeds. The OPMAN will be submitted to the USCG for final approval prior to commencement of any operations. The Operations and Maintenance Philosophy for the DWP is included in Volume III, Attachment 23, "Operations and Maintenance Philosophy," (*Confidential*).

26 §148.105(y) Risk and Consequence Assessment

26.1 Deepwater Port Risks

If an LNG spill were to occur offshore at the site of the Project, the impact on the environment would be immediate given the cryogenic properties of LNG. A spill, whether from a tank or other equipment on the West Delta DWP, would likely have an instantaneous effect on people and any marine life coming into immediate contact with the LNG pool. This effect would quickly diminish as the liquid began to absorb ambient heat from the environment. If a spill were to occur on the platform, any personnel in the immediate vicinity could be affected by cryogenic liquid, or by vapors as the liquid vaporizes. The risk of thermal radiation is a risk if an ignition source is present, which is a possibility as the vapor reaches the lower flammability limit.

A spill into surrounding waters would cause immediate effect on any marine life coming into contact with the liquid. Any other marine life would likely immediately leave the area of the spill, and thus not be affected. The impact on marine would likely be minimal as the liquid came into contact with ambient heat sources and began to vaporize. If the LNG vapor at the given dispersion rates were to make landfall, then marine life and coastal populations would be threatened the most. Threats and the overall impact of LNG in water would depend on the volume of LNG spilled and the environmental conditions during the response efforts. Minor spills on vessels or structures at the West Delta DWP would produce a risk of ignition leading to an airborne explosion, which would lead back to the source but would not likely impact the marine environment. Dependent on the size of the spill and the remedial actions taken, LNG spills in the environment generally have negligible to no impact on marine life or the coastal environment, as the vapors are dispersed or broken down at a rate faster than clean-up action can occur. In the event of an LNG spill, the DWP emergency response plan would be implemented to ensure minimal potential impact, in accordance with the DWP Operations Manual (Volume III, Attachment 24, "Operations Manual with Security Plan," [*Confidential*]).

26.1.1 Vapor Dispersion Hazards

The Applicant has prepared a risk analysis, provided in Volume III, Attachment 26, "West Delta Deepwater Port LNG Export Development Spill Consequence Analysis," [*Confidential*]). The accidental release effect zone reaches 2.8 statute miles (4.5 kilometers) from the proposed location of the West Delta DWP. A total of 21 platforms are located within the accidental release scenario effect zone, three of which are continuously manned. The nearest of these platforms is the unmanned WD030F platform, which is owned and operated by Energy XXI and located 0.6 statute mile (1.0 kilometer) away. The nearest manned platform is the Energy XXI WD031E-COMP platform, located 2.5 statute miles (4 kilometers) from the proposed Project and within a complex that includes a drilling unit and a quarters platform.[9]

26.1.2 Thermal Radiation Hazards

Similar to the vapor dispersion analysis, the thermal radiation hazard distances for pool fires from accidental, intentional, and cascading releases from LNG tanks were calculated by Risknology and show that low flux (5 kilowatts per square meter) thermal radiation levels generated from a dimensioning accidental release case pool fire are calculated to reach 1.11 statute miles (1.79 kilometers). The two nearest platforms (Energy XXI WD030F and WD030B) are at a distance of 0.6 statute mile (1.0 kilometer) and 1.0

[9] Risknology. 2019. Report No. 1069-LNG 21 SCA-RPT-00D.

statute mile (1.6 kilometers) from the proposed West Delta DWP, and within this effect zone. All other platforms are beyond the hazard distance. In the case of the largest, cascading, three-tank 12-square-meter breach scenario, three manned and 11 unmanned platforms can be reached by the low flux radiation level. With appropriate warning and response, workers on the manned platforms could shelter and protect themselves from thermal radiation exposure. None of the cases considered would generate threshold thermal radiation flux levels at the nearest point along the shipping fairway, which is 16 statute miles (26 kilometers) away. As previously noted, Volume III, Attachment 26, "West Delta Deepwater Port LNG Export Development Spill Consequence Analysis," [*Confidential*], describes the methods, scenarios, and results of the LNG spill modeling contracted by West Delta LNG, LLC.

Should vapor become airborne, the scenario would be dictated by the prevailing winds onsite. Wind measurements from Station BURL1 Southwest Pass, Louisiana, were used to develop operational wind statistics. This station is owned and operated by the National Oceanic and Atmospheric Administration (NOAA) National Data Buoy Center and is located approximately 16.5 nautical miles (19 statute miles, or 30.5 kilometers) from West Delta Lease Block 44. The gaps in the time series, if any, were filled with data from National Data Buoy Center Station GISL1 Grand Isle, Louisiana (which is the same station as Station 8761724 Grand Isle) and Wave Information Studies data, in that order of preference. The rose's exceedance percentiles were calculated using 10-minute averaged wind speed at a 33-foot (10-meter) height from mean sea level. The wind speed exceeded 29.9 feet per second (9.1 m/s, 20.4 miles per hour [mph], or 32.8 kilometers per hour [km/h]) approximately 10 percent of the time. Wind speeds (2-minute average at a 33-foot [10-meter] height) typically range from calm to 11.5 mph (5.1 m/s, or 18.5 km/h) and exceed 17.5 mph (7.82 m/s, or 28.2 km/h) and 23 mph (10.28 m/s, or 37 km/h) approximately 6 percent and 1.5 percent of the time, respectively. Wind speeds exceeding 17.3 mph (7.73 m/s, or 27.8 km/h) and 23 mph (10.28 m/s, or 37 km/h) are observed to occur most frequently from the north. The maximum wind speed in the record is 75.9 mph (33.93 m/s, or 122.2 km/h) with a time stamp of August 29, 2005, which corresponds to the route of Hurricane Katrina.

A mix of climate conditions typical of tropical and temperate zones exists along the north-central coast of the Gulf of Mexico. This area receives abundant rainfall and exhibits moderate temperatures, with only a few short periods when temperatures reach freezing or below. Average yearly rainfall in southern Louisiana is approximately 56 inches (142.2 centimeters). Air temperatures over the central Gulf of Mexico typically range from 84°F (29°C) in the summer to 63°F (17°C) in the winter. Coastal winds are variable as a result of moving cyclonic storms and are characteristic of the continent and land/sea breeze regime, with less variability over open waters. Over the Gulf of Mexico, annual humidity levels are relatively high throughout the year, with maximum humidity occurring during the spring and summer due to prevailing southerly winds. Early morning fog along the coastline can develop due to the warm, moist air, but this condition typically decreases seaward and generally lasts only 3 to 4 hours.

26.1.3 Hurricanes and Tropical Storms

Hurricanes and tropical storms pose a risk to the Project. The official hurricane season for the Atlantic Basin (the Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico) begins June 1 and ends November 30. Tropical conditions in the Gulf of Mexico typically peak from mid-August to late October and threaten navigation and other activities.

Tropical cyclones with maximum sustained surface winds of less than 40 mph (64 km/h) are called "tropical depressions." Once tropical cyclones reach windspeeds of about 40 mph (64 km/h), they are called "tropical storms" and assigned names. If windspeeds reach 74 mph (110 km/h), they are called "hurricanes." The category of "intense (or major) hurricane" has been utilized for the Atlantic Basin for tropical cyclones obtaining winds of at least 111 mph (178 km/h), which corresponds to a Category 3 or greater on the Saffir-Simpson hurricane intensity scale.

The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant damage and loss of life. Evacuation of the West Delta DWP and minimum manning standards in this event will be addressed in the Project's Operations Manual. A table of contents for the proposed DWP's OPMAN is included in Volume III, Attachment 24, "Operations Manual with Security Plan," (*Confidential*).

26.1.4 Vessels

All vessels approaching or departing the Project are directed to BOEM Notice to Lessees and Operators No. 2016-G01, as stated in Volume IIa, Section 4, "Marine Environment," which provides guidance on the implementation of monitoring programs to minimize the risk of vessel strikes to protected species (e.g., sperm whales, manatees, sea turtles) and the required reporting procedures for injured or dead individuals. Collisions with OCS support/service vessels engaged in supporting oil and gas industry activities could injure or kill protected species. Therefore, specific measures, including protected species identification, maintaining minimum distances based on the species, and avoiding excessive speed or abrupt changes in direction, are recommended to reduce the risks associated with vessel strikes or disturbance of protected species. This NTL also provides specific instructions and contact information for reporting sightings of injured or dead protected species.

A spill of hazardous substances into marine habitats can result in impacts if migration and direct impact affect the resource or the water quality near the resource. The West Delta DWP will be required to comply with Section 311 of the Clean Water Act through development of a facility-specific Spill Prevention Response and Countermeasures Plan that directs the storage, handling, and transfer of all hazardous materials. Various chemicals, refrigerants, fuels, and lubricants would be stored on each of the platforms making up the DWP. Several types of these materials are stored on multiple platforms. Table 1-17 in Volume IIa, Section 1, "Project Description, and Purpose and Need," provides a list of the chemicals and lubricants that would be stored at the DWP. A detailed listing of chemical and lubricants that would be stored at the DWP is provided in Volume III, Attachment 14, "Utilities and Chemicals Consumption List," (*Confidential*).

27 §148.105(z) Environmental Evaluation

The Applicant has prepared an Environmental Evaluation (Volume II) of the proposed West Delta DWP in support of this DPLA. The role of this Environmental Evaluation is to provide the primary information to determine whether the proposed DWP meets the elements of the Secretary of Transportation's purpose and need. Where applicable, this document also considers safety but does not function as the final safety screening. More detailed aspects of port safety, including transportation routes, will be addressed in the Port Operations with Security Plan. The Project's Offshore Operations and Maintenance Philosophy is provided in Volume III, Attachment 24 [*Confidential*]. This document provides the basic framework of the Port Operations Manual, to be further refined and developed during the front end engineering design phase of the Project. The final Operations Manual with Security Plan requires USCG approval prior to initiation of port operations. A preliminary working draft of the West Delta LNG Project's Port Operations with Security Plan is provided in Volume III, Attachment 25 [*Confidential*].

The Environmental Evaluation assesses the potential environmental effects associated with construction and installation, operations, potential upsets/accidents, and decommissioning of the proposed Project. This document has been prepared in anticipation of compliance with requirements, the Council on Environmental Quality regulations for implementing the NEPA (40 CFR 1500-1508), U.S. Department of Transportation Order 5610.1C Procedures for Considering Environmental Impacts), and USCG policy (Commandant's Instruction [COMDINST] M16475.1D).

The primary objectives of the Environmental Evaluation are to:

- Provide an environmental analysis sufficient to support the Secretary of Transportation's licensing decision;
- Demonstrate that the West Delta DWP would be located, constructed, and operated in a manner that represents the best available technology necessary to prevent or minimize any adverse effects to the environment;
- Aid in the USCG's and MARAD's compliance with NEPA; and
- Facilitate public involvement in the decision-making process.

The Environmental Evaluation analyzes the potential consequences of the proposed Project and the alternatives that have been identified and deemed reasonable. The assessment is based on available data and literature, Project-specific surveys, and desktop studies. In cases where limited data are available, the assessment is based on qualitative judgment through the understanding of the local and regional setting; understanding the proposed actions; and predicting effects from similar actions, agency positions on these, and/or published science. In addition, the Environmental Evaluation proposes measures to mitigate potentially adverse environmental consequences of the activities associated with the Project.

The Applicant's Environmental Evaluation of the proposed Project components comprises the following:

- Volume IIa – Offshore Project Components
- Volume IIb – Onshore Project Components

27.1 Offshore/Marine Components

Volume IIa, "Offshore Project Components" of this DPLA includes: (1) an introduction and project description, (2) an alternatives analysis, (3) nine environmental, socioeconomics, and safety and security resource sections, and (4) a list of preparers. Supplemental baseline studies were also conducted to support the development of this DPLA and are included as appendices and attachments within Volumes I, IIa, IIb, III, and IV. The general outline of Volume IIa is detailed below in Table 27-1. A brief summary of each section within Volume IIa is provided in the sections that follow.

Table 27-1
Content of Volume IIa, Offshore Project Components

Section	Content
1	Project Description, and Purpose and Need
2	Alternatives Analysis – Onshore and Offshore
3	Water and Sediment Quality and Use
4	Marine Environment
5	Commercial and Recreational Fisheries
6	Wildlife and Protected Species
7	Cultural Resources
8	Socioeconomics – Onshore and Offshore
9	Geologic Resources
10	Coastal Zone, Recreation, and Aesthetics
11	Meteorology, Air Quality, and Noise
12	Safety and Security
13	List of Preparers for the Deepwater Port License Application
Appendix	**Content**
A	Subsea Pipeline Charts
B	Framework for Cumulative Impacts Analysis – Offshore and Onshore Components
C	List of Permits and Approvals – Offshore and Onshore Components
D	Stakeholder Outreach
E	Informal Consultation Letter
F	National Environmental Policy Act Air Dispersion Modeling Report
G	Essential Fish Habitat Assessment
H	Water and Sediment Sampling Report
I	Ichthyoplankton Impact Assessment
J	Baseline Underwater Noise Survey and Modeling
K	Unanticipated Discoveries Plan – Offshore Components
L	Emissions Calculations for Offshore Construction
M	Operational Emissions Calculations for Offshore Stationary Sources
N	Operational Emissions Calculations for Offshore Mobile Sources
O	Siting Map (*Confidential*)
P	Stakeholder Outreach (*Confidential*)

Section 1 – Project Description, and Purpose and Need

Section 1 of Volume IIa includes a detailed description of the offshore Project components and the associated construction and installation, operation, and decommissioning stages.

Section 2 – Alternatives Analysis – Onshore and Offshore

Section 2 describes the need for the Project and the process and criteria for identifying and evaluating alternatives to the Project. The following alternatives were examined:

- No action, energy source, and system alternatives;
- Offshore versus onshore alternatives;
- DWP site alternatives;
- Proposed pipeline interconnect between the Venice Pretreatment Plant and the West Delta DWP; and
- Design and technology alternatives.

The alternatives analysis presents a range of practicable alternatives to the proposed action in accordance with the requirements of NEPA. However, these requirements do not call for the consideration of every possible alternative; rather, only a suitable number of examples covering a range of practicable alternatives need to be considered. The alternatives analysis conducted for the Project only considers alternatives that are technically viable, practical, and economically feasible.

The alternatives analysis also considers options that may reduce environmental impacts in comparison to the proposed Project. Through the application of evaluation criteria and subsequent environmental comparisons, each alternative was evaluated until it became apparent that it was not reasonable or would result in significantly greater environmental impacts that could not be reasonably mitigated. The alternatives that appeared to be the most reasonable and had fewer or similar levels of environmental impact compared to the proposed Project were fully evaluated for this alternatives analysis.

Section 3 – Water and Sediment Quality and Use

Section 3 describes water and sediment quality in the northern Gulf of Mexico. For the purposes of this section, water and sediment quality is defined as a measure of the condition of water or sediment relative to the requirements of one or more biotic species or to any human need or purpose it supports. This section includes a discussion of impacts from construction and installation, operation, and decommissioning of the offshore portion of the proposed Project and how those impacts may affect existing conditions.

In Section 3, water quality is discussed in terms of existing coastal and marine systems. The primary variables that affect these environments are temperature, dissolved oxygen, salinity, pH, nutrients, contaminants, and turbidity. Assessments conclude that existing water quality within the Gulf of Mexico coastal and marine systems is highly influenced by human activity and is the primary cause of degraded water quality via excess nutrients. The ecological condition of the coastal northern Gulf of Mexico was judged to be fair to poor, with fair water quality, and expressions of eutrophication were high.

Because public data on sediment quality near the proposed West Delta DWP site were limited, site-specific sampling was conducted to determine bottom and sub-bottom composition and chemistry in the proposed DWP location. Additional sampling is currently underway to determine sediment quality along

the proposed 30-inch (0.8-meter) diameter pipeline route. Appendix H discusses the results of completed surveys.

Potential impacts on water and sediment quality as a result of Project construction and installation, operations, upsets and accidents, and decommissioning could occur due to the effects of dredging, pile driving, HDD, and removal of fixed structures. However, all of these effects are expected to be temporary and localized. Installation of the platforms and subsea pipeline could result in increased turbidity and re-suspension of sediments from direct contact of structures to the seafloor, but this is expected to return to previous conditions once complete. Minor, accidental spills resulting from construction and support of LNG trading carriers associated with the West Delta DWP would temporarily reduce water quality. Long-term effects from scour are not expected due to the relatively low tidal/current speeds and the soft-sediment bottom in the northern Gulf of Mexico. Decommissioning would result in short-term, negligible, localized impacts on water quality, but these would dissipate quickly after activities cease.

Section 4 – Marine Environment

Section 4 describes the current marine environment, including the oceanographic and physical attributes, and existing unique habitats resulting from these factors, within the north-central region of the Gulf of Mexico. The Gulf of Mexico is divided into marine and coastal ecoregions, with the proposed Project site located within the northern Gulf of Mexico region, which encompasses over 65 percent of tidal marsh nursery habitat in the United States. This region receives water from 37 major rivers and extends from Gullivan Bay on the west Florida coast to north of the Rio Panuco in the state of Tamaulipas, Mexico.

The northern Gulf of Mexico region includes coastal areas in west Florida, Alabama, Mississippi, Louisiana, and Texas. Section 4 discusses existing coastal environments within this region, including wetlands, barrier beaches, dunes, and seagrass beds, as well as existing marine environments such as the continental shelf, deepwater, and bottom substrates.

Minor but localized impacts on the marine environment via water quality and currents are expected during construction and installation, operation, and decommissioning of the Project. Construction impacts would include increased turbidity and sedimentation resulting from pipeline and platforms installation. Minor spills from construction and operation support vessels may result in water quality impacts that could affect marine resources, but adherence to the Project's Facility Response Plan would minimize these effects. Minor, insignificant impacts from turbidity and sedimentation as a result of scour around each platform pile could occur. Changes to currents would be negligible during all phases of the Project. No impacts on regional sensitive marine resources are expected from construction and installation, operation, upsets and accidents, or decommissioning of the proposed Project.

Section 5 – Commercial and Recreational Fisheries

Section 5 describes existing commercial and recreational fisheries in fresh, estuarine, and marine waters within the state of Louisiana and extending into federal waters of the Gulf of Mexico. The analysis includes both onshore and offshore Project components, identifying applicable laws and regulations, existing habitats and resident species, and managed commercial and recreational fisheries. It also includes potential impacts (and cumulative impacts) of the proposed activities, as well as proposed mitigation, minimization, and/or avoidance measures.

Louisiana inland freshwaters and estuarine waters, as well as the coastal and offshore waters of the Gulf of Mexico, provide a wide variety of habitat for many species of fish. In order to discuss existing fish populations within these habitats, fish were grouped per habitat preferences, which generally coincides with life history characteristics (e.g., salinity tolerances, spawning preferences). Habitat preference groups

included freshwater, estuarine water, and offshore/coastal water. Section 5 also discusses existing managed fisheries in both state and federal waters, as they pertain to both commercial and recreational industries.

Potential impacts on commercial and recreational fisheries as a result of Project construction and installation, operations, upsets and accidents, and decommissioning could occur due to the effects of dredging, pile driving, and removal of fixed structures. However, all of these effects are expected to be temporary and localized. The main impact on fisheries resources due to the proposed Project would be the displacement of fishers within the safety zone during operation. The area of previously available fishing grounds removed would be a very small percentage of the total available fishing grounds in onshore waters of Louisiana and the Gulf of Mexico; therefore, impacts on fisheries are expected to be negligible. Additionally, the Applicant will avoid, minimize, and/or mitigate any potential impacts on fisheries, to the extent practical.

Section 6 – Wildlife and Protected Species

Section 6 describes nearshore and marine habitats within the northern Gulf of Mexico that provide support for various marine biota and resources. This section also describes the regulatory environment associated with various marine wildlife and protected species that may occur within the northern Gulf of Mexico near the proposed Project location. It also describes the conditions existing at the site of the proposed Project and how construction and installation, operation, and decommissioning of the proposed Project may impact local wildlife and protected species. The discussion of the existing environment is grouped by fish and invertebrates, benthic communities, marine mammals, sea turtles, and marine/coastal birds.

Existing benthic communities within the Project area are discussed in Section 5. The majority of the benthic habitat within the northern Gulf of Mexico consists of a soft muddy bottom with polychaeta worms, crustaceans, and mollusks dominating benthic communities on the OCS, with sporadic concentrations of sponges and soft and hard corals. Faunal distributions are primarily influenced by sediment composition or grain size, but physicochemical parameters, such as temperature, salinity, and distance from shore, can also be used to define their occurrence. The two species of corals listed for nearshore waters of the Gulf of Mexico and existing marine sanctuaries are discussed in Section 6.

Six federally listed threatened or endangered fish occur within the nearshore waters of the Gulf of Mexico, as well as a number of fish designated as “species of concern.” Habitats that are identified and protected by the National Oceanic and Atmospheric Administration, National Marine Fisheries Service, are described in Volume IIa, Appendix G, “Essential Fish Habitat Assessment.” Existing ichthyoplankton communities within the Project area, typically made up of fish eggs and larvae, were also assessed. A full ichthyoplankton analysis is provided in Volume IIa, Appendix I, “Ichthyoplankton Impact Assessment.”

Seven whale species, two additional marine mammals, and five species of sea turtles are listed as threatened or endangered and have the potential to occur within the Project area. Preferred habitats, typical life characteristics, and likelihood of occurrence within the Project area are discussed in Section 6.

The marine/coastal birds most likely to occur near the Project area are seabirds and, potentially, some migratory birds. Generally, seabirds are defined as species that spend extended periods away from land and predominantly obtain their food from the sea while diving, flying, or swimming. Additionally, 10 bird species occurring in coastal habitats in the northern Gulf of Mexico are federally listed as threatened or endangered. Detailed information on each of these species can be found in Section 6.

Potential impacts on wildlife and protected species as a result of Project construction and installation, operations, and decommissioning could occur due to the effects of dredging, pile driving, HDD,

and removal of fixed structures. However, all of these effects are expected to be temporary and localized. The Applicant would avoid, minimize, and/or mitigate potential impacts on wildlife and protected species, to the extent practical. The application of the proposed mitigation measures and the short-term nature of the proposed pile driving activities would make impacts temporary, reversible, and negligible. Negligible impacts on water quality and, thus, on marine wildlife, during operation of the West Delta DWP would occur as a result of permitted discharges associated with DWP operations. Minor spills from construction and operation support vessels may result in water quality impacts that could affect marine resources, but adherence to the Project's Facility Response Plan would minimize these effects.

Section 7 – Cultural Resources

Section 7 addresses the types of cultural resources that are generally found within this environment, the geological matrices found within the study area, the specialized techniques used to identify submerged cultural resource sites, and the comprehensive results of intensive archaeological analyses that have occurred within the Project's APE.

Scientific research has shown that archaeological sites containing contextual data occur along the former land surface that is now submerged and buried on the OCS. Section 7 discusses known and potential prehistoric and historic resources in this area. The prehistoric resources analysis outlines the tools used to predict locations of submerged prehistoric sites and a timeline description of the origins of the modern Mississippi River delta. Additionally, four major cultural periods were listed as occurring along Louisiana's portion of the OCS: the Pre-projectile Period, Paleoindian Period, Archaic Period, and the Poverty Point Period.

For the historic resources analysis, files maintained within the BOEM/ Bureau of Safety and Environmental Enforcement (BSEE) Archaeological Resource Database; the National Oceanic and Atmospheric Administration Office of Coast Survey's Wrecks and Obstruction Database; and the Fugro Chance Hazards Database were consulted in a search for known archaeological sites and previously surveyed locations in the Project area. Initial research included the assessment of existing literature, cartographic sources, and files to augment the geophysical data assessments of the offshore Project area. The regional probability for shipwrecks within the Project APE is considered to be moderate to high; the level of preservation of a wreck under current environmental conditions would also be considered moderate to high due to deep silt deposits and submerged anaerobic environments. Reported shipwrecks, obstructions, and National Register of Historic Places properties are detailed within this section.

Section 7 also describes geophysical and geotechnical surveys conducted near the site where two shipwreck sites and 11 other unidentified obstructions have been documented within the Mississippi Delta from Bastian Bay to Little Red Pass. It also details the results of another study, an Archaeological and Hazard Survey for the West Delta DWP, that was conducted near the proposed DWP site and along the proposed pipeline route. This section also describes the results of another navigable area survey from Barataria Bay to the Southwest Pass, which updated existing nautical charts and documented one dangerous obstruction associated with a modern shipwreck; a hydrographic survey in the same area that identified numerous subsea pipelines with several exposed on the seabed; and a site-specific Archaeological and Hazard Survey for the proposed DWP and pipeline route. A cultural resources evaluation was also conducted to locate and identify cultural resources in the survey area that could be physically disturbed by Project-related activities. The procedures and results of this evaluation are included in Section 7.

Potential impacts from the Project on existing cultural resources may occur during construction and installation, upsets/accidents, and/or the decommissioning process. The construction and installation and decommissioning phases of the West Delta DWP and pipeline would cause seafloor and sediment disturbances that could impact cultural resources; however, all components would be positioned to avoid

potential significant targets by having a 1,000-foot (305-meter) clearance. Cultural resources may also be impacted due to a limited spill of oil, hazardous materials, or debris or in the event of a vessel collision. Sediment impacts associated with upsets/accidents are not expected to occur, given that subsea releases of natural gas would rise to the surface and dissipate. Similarly, surface releases of LNG, if they occur, would float on the surface and quickly dissipate. Releases of limited amounts of petroleum hydrocarbons stored on LNG trading carriers and support vessels would be more persistent but would mostly float to the surface. Heavy petroleum components, if any, and debris would have limited impacts on the seafloor. In the event of an accident/upset, the Applicant would evaluate the impacts on cultural resources and develop and implement appropriate clean-up measures in accordance with regulatory requirements. Therefore, any potential impacts on cultural resources due to the Project would be temporary and negligible.

Section 8 – Socioeconomics – Onshore and Offshore

Section 8 characterizes socioeconomic conditions in the vicinity of the West Delta LNG Project and how the Project may affect these conditions. The socioeconomic attributes addressed in this section are population, workforce, housing, public services, economic investments, tax revenues, and environmental justice. Although commercial and recreational fishing industries are also socioeconomic attributes, these industries are addressed in Section 5, as previously described.

The offshore portion of the Project would be located roughly equidistant to several parishes in Louisiana; therefore, the local area would actually be dispersed over a large region. Moreover, the offshore workforce would have extended work cycles (e.g., 2 weeks on followed by 2 weeks off) that would eliminate daily commutes. Hence, fewer hired workers who do not already live in southeast Louisiana would find it necessary to move to this location because their work schedule would allow time for long drives or flights home. Section 8 summarizes the Project's anticipated workforce needs and describes attributes most relevant to the Project's potential impact on socioeconomic conditions in the region. It also describes the existing labor force and employment rates for the region.

In addition to existing and proposed labor, Section 8 details population and housing statistics within the study area. Population change can be an indicator of the activity level of the local economy because it signals that the economy may be growing, shrinking, or maintaining. Population levels in portions of the study area are still below year 2000 levels, indicating that the economies in those parishes have not been fully restored after Hurricane Katrina. Potential construction workers for the Project are likely to seek housing from temporary options such as vacant units that are for rent or seasonal, recreational, or occasional use units; hotels and motels; or recreational vehicle (RV) parks and campgrounds, or RV spaces. The seven-parish study area contains over 16,000 hotel and motel rooms and nearly 2,500 RV park and campground spaces; however, only a percentage would be available at any given time. Orleans Parish has the greatest number of hotel and motel rooms in the study area, followed by Jefferson Parish. Based on the ratio of rooms to hotels and motels, the other parishes have, on average, much more modestly sized hotels compared with the largest two parishes. The primary study area contains about 30 percent of the estimated hotel and motel rooms and a little under 40 percent of the RV park and campground spaces.

Availability of medical services, public safety services, and schools is also a practical consideration when commencing major infrastructure developments. Should accidents, emergencies, or other upsets occur during construction or operation, the nearest hospitals, emergency medical services, fire departments, police departments, and sheriffs' offices may be called upon to assist. If a proposed development would draw temporary workers and their households from outside the region, the new, temporary residents could increase demand for those services in the communities where they reside. Moreover, temporary workers could enroll their school-aged children in local public schools, increasing demand on the school systems. Section 8 details these existing services, as well as the existing taxes and revenues, and the environmental justice regulations currently in place.

Potential impacts on socioeconomics during construction and installation of the Project could include changes to the current economy, labor force, taxes, and revenue. These impacts are expected to be positive. The Applicant would contract with local and regional firms along the Gulf Coast (e.g., marine service contractors and manufacturers, support vessel outfits, equipment suppliers) to fabricate Project components, procure materials, and acquire the necessary services to install onshore and offshore components. A large workforce consisting of a large local contingent would be hired. Additionally, local and state taxes would be collected on offshore platform component fabrication and materials, installation of offshore pipeline in state waters, payrolls, and transactions with local service providers and suppliers. Workers would also pay taxes on hotels and local spending. Moderate positive impacts are also expected to occur during operations as the Applicant would regularly hire local service providers to support operations and a minor number of permanent positions would be created. And, similar to construction and installation, a moderate positive impact would occur on the workforce, economy, taxes, and revenue. The only anticipated negative impacts on socioeconomic resources would be temporary and negligible.

Section 9 – Geologic Resources

Section 9 describes the overall geologic setting and geologic conditions at the proposed West Delta DWP site. Geophysical and geotechnical conditions, geologic hazards, and mineral resources that may exist at the proposed DWP site are detailed in this section. It also discusses activities associated with the construction and installation, operation, and decommissioning of the DWP that are likely to have environmental consequences on geologic resources.

The existing geological setting in the Gulf of Mexico includes a roughly circular structural basin approximately 1,000 statute miles (1,610 kilometers) in diameter. The basin incorporates the Gulf of Mexico and extends onshore to include all of Florida and Louisiana, the southern portions of Georgia, Alabama, Mississippi, southeast Texas, the eastern portion of Mexico, the northern portion of Guatemala, and almost all of the Yucatan Peninsula. Morphology of the modern continental shelf has been controlled primarily by sea level fluctuations during the Pleistocene epoch, sedimentation of the Mississippi River, and tectonics associated with diapirism (the geologic intrusion of a body in which the intrusive body is forced up into brittle overlying rocks). Section 9 details the shelf off of Louisiana, sedimentation rates, the seafloor morphology, and which structural features bound the Gulf of Mexico as a whole.

Section 9 also outlines the site-specific geologic features in the Project area, based on offshore geophysical and geotechnical surveys conducted in the spring of 2018 and 2019. Water depths in the West Delta DWP study area range from -51 feet (-15.5 meters) mean sea level (MSL) in the northeast portion of the study area (West Delta Lease Block 46), to -83 feet (-25.3 meters) MSL in the southwest portion of the study area (West Delta Lease Block 44). Within the pipeline study area, the water depths range from a minimum of -4.7 feet MSL (West Delta Lease Block 24) to a maximum of -75.9 feet MSL at the farthest southwest extent of the study area.

Generally, the seafloor is smooth and featureless and slopes toward the southwest at an angle of less than 0.5 degree. The seafloor slopes to the southwest at an angle of less than 0.3 degrees in the offshore pipeline survey area. Two subtle highs or ridges trend toward the southwest and can be traced shoreward in regional bathymetry. An area of irregular seafloor texture and shallow depressions produces local slopes of up to 3.8 degrees over the larger of the two ridges. Silt and fine sand are indicated across the survey area with a greater proportion of finer sediments likely in the deeper water depths, west of the main ridge, and slightly coarser sediments on the bathymetric highs found along the ridges. Irregularly shaped depressions appear along the main ridge, within which finer sediments have likely accumulated. The depressions are thought to be the result of the historic Mississippi River delta depositing large amounts of organic material that generated low concentrations of biogenic gas after burial. The depressions may also be the result of a

combination of gas expulsion and scour caused by bottom currents. Overall, seafloor conditions were determined to be generally favorable within the study area for the proposed West Delta DWP infrastructure.

Section 9 also addresses geologic hazards, including faults, salt diapirs, seismic hazards, seabed subsidence, tropical storms/hurricanes/surges, and tsunamis, along with existing mineral resources in the Project area. Potential impacts on geologic resources could occur due to seabed-disturbing activities associated with the Project that could cause erosion of sediments in the upper several feet of the seafloor and disturbance of sediments from the mudline to the total depth of driven piles. However, overall impacts are expected to be temporary and reversible, and therefore negligible.

Section 10 – Coastal Zone Use, Recreation, and Aesthetics

Section 10 describes coastal zone uses, recreation areas, and aesthetics within the north-central region of the Gulf of Mexico. These include offshore oil and gas activities, non-energy mineral resources, marine traffic/commercial ports, military use, commercial fishing, and recreational fishing/boating.

The west-central portion of the northern Gulf of Mexico constitutes one of the world's major oil- and gas-producing areas and has proven to be a steady and reliable source of crude oil and natural gas for more than 50 years. In 1947, the first offshore oil and gas well was drilled out of view from the Louisiana coastline. Among the 50 states, Louisiana is the top producer of crude oil, with approximately 88 percent of the nation's offshore oil production platforms located off its coast, and the state is the fourth-highest producer of natural gas (including onshore and offshore) in the United States, behind Texas, Pennsylvania, and Oklahoma. Section 10 further details the Western, Central, and Eastern BOEM planning areas and the estimated volumes of undiscovered and recoverable oil and gas resources. This section also details other potential minerals that can be obtained from the OCS, such as sand and gravel.

Marine traffic and commercial ports are also active within the Project area and include shipping safety fairways, general vessel traffic, and commercial ports. Seven of the top 10 commercial ports in the United States (by cargo tonnage) are located along the Gulf Coast, with the Gulf of Mexico having a network of designated shipping safety fairways that are the de facto marine highways for vessels traveling throughout the Gulf of Mexico. Vessel traffic density maps were created to show the high volumes of vessel traffic typically located in areas distant from the Project area. Vessel types with the highest density near the Project area are fishing vessels and those listed as "other vessels." Passenger vessels also cross within the Project vicinity, primarily to the north. Of all the vessel types analyzed, cargo vessels perform the lowest number of trips through the Project area. As many of the vessels transiting through the site are accessing ports nearby, Section 10 details ports in the region that were ranked among the top 150 ports in the United States by cargo tonnage in 2017. These ports include South Louisiana, New Orleans, Mobile, Plaquemines, Port Fourchon, and Port of Terrebonne. Section 10 further details the primary shipping safety fairways that vessels utilize to enter/exit the ports, the total cargo in metric tons from 2017, and the cargo percentage change from 2016 to 2017.

The U.S. Department of Defense performs various air and water training activities in the Gulf of Mexico, including aircraft carrier operations, rocket and missile research and testing, air-to-air gunnery, sonar buoy operations, and pilot training. These military uses are illustrated in Section 10. The closest military warning area to the proposed Project site is W-54B, located approximately 42 nautical miles (48.3 statute miles, or 77.8 kilometers) southwest of the proposed West Delta DWP. The Houston Air Route Traffic Control Center is the controlling agency for W-54B. The warning area does not overlie the proposed Project site, and no military training routes intersect West Delta Lease Block 44. As such, there are no warning areas or military training routes that would interfere with vessel or helicopter transits from shore to the DWP. Military activities are not solely confined to the warning and water testing areas, since vessels and aircraft must travel from shore-based facilities or other offshore areas to the designated testing area.

The USCG also conducts activities, including, but not limited to, routine patrols, maintenance of aids to navigation, emergency spill response, and search and rescue missions. Such activities could occur at any time within the Gulf of Mexico.

Commercial fishing as an important use of the marine environment located offshore of the state of Louisiana and, more specifically, offshore of southeast Louisiana in the vicinity of the proposed Project. On average, from 2008 to 2017, landings from Louisiana accounted for over 70 percent of total commercial landings for Gulf of Mexico states. Additionally, other than in 2015 and 2017, the percentage of Gulf Coast commercial landings from Louisiana was consistently above 70 percent from 2008 to 2017. Section 10 details landing values for Louisiana and the Gulf of Mexico as a whole over a 10-year period from 2008 through 2017 and illustrates the landing amounts for three major fishing ports near the proposed West Delta DWP over the same period of time.

Recreational boating and fishing activities overlap in Louisiana, as the majority of boat trips are taken for the purpose of recreational fishing. Louisiana has a high proportion of boat registrations compared to its population. As of 2016, the state of Louisiana was ranked 13th for registered boats in the United States while being ranked 25th for population, and the number of registered boats in Louisiana makes up 2.6 percent of all boats registered in the United States. The coastal parishes in the region offer access to a large selection of marinas and boat ramps for recreational boaters, including 10 public boat launches for private recreational boaters in Lafourche Parish, nine in Plaquemines Parish, and four in Jefferson Parish. Other recreational boating activities include scuba diving and cruise ship activities.

The West Delta DWP area features open ocean dotted by oil and gas platforms, with occasional drilling rigs and aids to navigation such as floating channel marker buoys. Recreational boaters can also pass through the area. The DWP, which would be located approximately 11 nautical miles (12.7 statute miles, or 20.3 kilometers) from the nearest Louisiana shoreline, may occasionally be noticeable to the casual observer once built. The closest land to the DWP site is uninhabited marshland. For inhabited areas, such as Grand Isle and Venice, Louisiana, located at a distance of 22 statute miles (35.4 kilometers) from the proposed DWP site, the curvature of the earth would obscure the DWP from an observer standing at sea level. Due to the Gulf of Mexico's heavy industrial nature near the Louisiana shoreline, it is unlikely that the majority of people in an area such as Grand Isle would take notice of the offshore Project components.

Impacts on coastal zone uses, recreation areas, and aesthetics from construction and installation, operation, and decommissioning of the offshore Project components are anticipated to be negligible to minimal based on the proposed activities and the application of mitigation measures. Negligible to minimal impacts on coastal zone uses, recreation areas, and aesthetics are anticipated during construction and installation, operations, upsets and accidents, and decommissioning of the offshore Project components. The primary construction impact would involve the temporary safety zones that would be established around the construction area during the 5 months of activity. Negligible to moderate impacts are anticipated during operation of the offshore Project components. Operational impacts would include the DWP safety zones, additional vessel traffic in the area in the form of the LNG trading carriers and support vessels, and increased pipeline and fixed platform structures within OCS Significant Sediment Resources.

Section 11 – Meteorology, Air Quality, and Noise

Section 11 describes air quality and noise regulations that are applicable under federal, state, and local jurisdictions; the existing environmental conditions for climate, meteorology, air quality, and ambient noise in the West Delta DWP area; and environmental consequences for air quality and noise from the construction and installation, operation, and decommissioning of the offshore Project components. In general, the onshore land area (county or parish) nearest to a DWP is the primary area of interest for assessing the potential impacts of offshore emission sources.

The state of Louisiana has a humid, subtropical climate, with long, hot summers and short, mild winters. Along and offshore of the southern Louisiana coast, climate is influenced by the Gulf of Mexico. The regional climate along the Louisiana Gulf Coast is represented by National Climatic Data Center and Southern Regional Climate Center data for Boothville, Louisiana. Climate data from this station are presented in Section 11.

Along Louisiana coastal areas from Southwest Pass to Sabine Pass, the climate is a mixture of tropical and temperate zone conditions. The area receives abundant rainfall and has moderate temperatures, with only a few short periods where temperatures fall to freezing or below. Extratropical or winter storm systems, fog, thunderstorms, and tropical cyclones occasionally occur. During the winter months, about 15 to 20 cold fronts reach the Gulf of Mexico. The mixing of cold and warm air may trigger the formation of extratropical storms in the Gulf of Mexico. Tropical cyclone and hurricane potential is discussed in Section 11. This section also contains a wind rose, developed from data obtained from the meteorological data set used for the air quality modeling analysis. These data were obtained by processing historical Weather Research Forecasting (WRF) model input data into input files for the air quality model. The WRF model generates a gridded wind field with 7.5-statute-mile (12-kilometer) spacing between data nodes based on buoy and other surface data reports. The wind rose represents the wind speed and direction at the WRF grid point closest to the proposed Project location. As detailed in Section 11, the predominant wind direction is from the southeast.

All Gulf of Mexico coastal parishes in Louisiana (including Plaquemines, the closest parish to the Project area) meet the National Ambient Air Quality Standards (NAAQS) for nitrogen dioxide, sulfur dioxide, carbon monoxide, ozone, particulate matter, and lead. Although lead is not monitored in Louisiana, the LDEQ and USEPA assess the need for monitoring based on the location of potential sources of lead emissions to determine if lead monitoring is necessary. In this region, there are no significant sources of lead emissions, and with lead additive removed from gasoline many years ago, the USEPA and LDEQ have determined that lead monitoring is not needed and that a sound basis exists to determine that the area is in attainment for the lead NAAQS. Significantly distant from the West Delta DWP site, but within Louisiana, parishes encompassing Baton Rouge were previously in moderate nonattainment of the 1997 8-hour ozone standard. These parishes have been re-designated as attainment and are subject to an ozone air quality maintenance plan. The closest air quality monitoring stations to the DWP are located onshore near populated and industrialized areas. Data from air quality monitoring stations in Louisiana nearest to the offshore location were used to characterize the background air quality for the onshore and offshore area potentially affected by offshore emissions from the West Delta DWP. These stations tend to represent area-wide ambient air quality conditions rather than localized impacts.

Existing ambient sound levels in the Gulf of Mexico are the result of naturally occurring sounds and sounds from anthropogenic sources (noise generated by human activities). Natural sounds are produced by sources such as wind currents in the atmosphere, and bird communications. Noise produced by ships is the single largest contributor to the total acoustic environment of the ocean. Service vessels would be the primary mode for transporting West Delta DWP personnel and supplies between service bases and offshore platforms, drilling rigs, derrick barges, and pipeline construction barges. Sound generated from service vessel traffic is transient. The intensity and frequency of the noise emissions are highly variable, both between and among these sources. However, there are typically long periods of low noise levels when service vessels are not present at a specific location.

Short-term air quality impacts would occur in the vicinity of construction of the West Delta DWP. Emissions produced during these construction activities would consist of typical engine combustion emissions. For pipeline construction, emission sources would not remain in one place for a lengthy period of time as vessels used for trenching and laying pipe would move along the pipeline route. For pile/jacket and platform installation, vessels used to construct these Project components would remain in the same

general area from Q1 of 2021 through Q2 of 2024; however, these emissions would nonetheless be temporary, would vary depending on level of installation activity, and would cease after completion of construction. Due to the temporary nature of the construction activity and the distribution of construction activity across a large area, air quality impacts would be short term and would cease at the completion of construction. Startup and commissioning of the DWP would produce temporary emissions during initial start-up and test runs of equipment onboard the platforms. The primary emissions during commissioning would be typical combustion exhaust emissions from operation of essential service engines and flaring of gases as facility cooldown occurs. Flaring would cease when sufficient power is available to operate the BOG compressors.

Operation of the West Delta DWP would produce emissions from equipment on the platforms (the continuously operating gas turbines and intermittent sources) and from the LNG trading carriers and support vessels (tug boats and supply vessels). Emissions from operation of the DWP may vary depending on the LNG production rate, which is tied to market conditions. Operation of the facility's stationary sources would be governed by the air operating permit issued by USEPA Region 6. Compliance with all emission standards, limits, operating procedures, and reporting and recordkeeping requirements would limit impacts on ambient air quality. Based on the air modeling results, the operation of the DWP would comply with all state and federal ambient air quality standards. The modeling results show that the expected levels of air emissions would have no adverse health effects in public offshore (recreational boaters and fishermen) or onshore areas, or on the environment, including visibility.

Short-term, minor impacts on the airborne noise environment would occur during pipeline installation, construction of the platforms, and installation of the decks with pre-installed equipment. Activities that would produce the greatest amount of noise near shore (where some airborne noise receptors are located) include HDD for the pipeline transition from onshore to offshore and pipelay vessel operation near shore. Construction of the platforms is not expected to affect onshore noise levels due to the distance between shore and the West Delta DWP location. Offshore recreational boaters and fishermen who travel near the construction site could be exposed to construction noise. However, given the temporary nature of construction events, and exclusion of boaters and fishermen within the temporary construction safety zone, noise impacts would be short term and minor. Long-term, minor impacts on the above-water noise environment in the immediate vicinity of the DWP would occur during routine operations. Noise would be created by the operation of various equipment and power systems at the DWP and vessels at the DWP. Since onshore noise-sensitive areas are over 10.5 nautical miles (12.1 statute miles, or 19.4 kilometers) away from the proposed DWP, there would be no discernible noise effects on onshore receptors. Although operational noise could result in annoyance to recreational boaters and fishers near the DWP, the safety zone to be established around the DWP would minimize the potential for recreational boaters and fishing vessels to operate in the immediate vicinity of the DWP. Overall, operational noise impacts would be short term and minor.

Section 12 – Safety and Security

The transportation, handling, storage, and processing of LNG and the transportation of associated natural gas requires strict controls to minimize potential risks and interruptions of gas supplies. Section 12 provides an overview of issues that would impact the safe and reliable operation of the West Delta DWP. Section 12 is limited to design, engineering, and operational components of the Project's infrastructure that, directly or indirectly, would have the potential to impact public safety. Safety of personnel working onboard the DWP would be fully addressed in the Project's OPMANOPMAN prior to commencement of operations, and is also beyond the scope of this document.

Section 12 discusses the physical properties and hazards of LNG. Potential hazards include flammable vapor cloud dispersion, pool fires, cryogenic hazards, and rapid phase transition. The DWPA

regulations would require West Delta DWP personnel to be educated on the hazards involved in the DWP's operation, trained in proper emergency and evacuation procedures, outfitted with appropriate personal protective equipment, and in compliance with other contingency plans and safety measures. Many of the detailed contingency plans and safety protocols have not been developed at this phase of the DWPA licensing process. Such details are required to be included in the DWP's OPMAN, which must be approved by the USCG prior to commencement of DWP operations. Therefore, Section 11 considers hazard scenarios based on their potential to impact the public. Public safety is discussed in terms of DWP safety, trading carrier safety, a gas release scenario, and a validation and sensitivity analysis. Three types of breaches were considered—accidental, intentional, and cascading—involving one or up to three LNG storage tanks.

In addition to public safety, which is paramount, the Applicant is also concerned with the safety of personnel working on or near the West Delta DWP. Another significant potential safety hazard associated with the DWP is the possibility of an uncontrolled release of LNG into the environment and a resulting fire. Although possible, such an event is unlikely. Other, more typical offshore safety and risk management concerns at the DWP include:

- Support vessel safety, including the possibility of collisions or allisions;
- Helicopter safety, including the possibility of aircraft collisions or other aircraft incidents;
- LNG process safety, including the possibility of process equipment leaks;
- Hazardous weather conditions, especially the possibility of severe hurricanes; and
- Routine injuries and accidents involving DWP personnel.

The Applicant has evaluated the risks and mitigation of the facility design, and findings are available in Volume III, Attachment 22, "HAZID Report" and Attachment 31, "Process Hazards Analysis (PHA) Report," (*Confidential*). The design is governed by several safety philosophies, studies, and plans that encompass fire and gas detection, fire protection, firefighting, emergency shutdowns, equipment layout, and emergency evacuation to ensure minimum risk to West Delta DWP personnel. These documents are available in Volume III (*Confidential*):

- Attachment 16, "Fire and Gas Detection Philosophy"
- Attachment 17, "Fire Protection and Firefighting Philosophy"
- Attachment 26, "LNG Spill Response Plan"
- Attachment 28, "Emergency Shutdown Philosophy"
- Attachment 29, "Emergency Egress, Evacuation, and Rescue Plan"
- Attachment 32, "Flare Radiation and Flameout Study"
- Attachment 33, "Process Safety Philosophy"
- Attachment 34, "Terminal Equipment Layout Study"

Section 12 includes additional information on marine safety and security, offshore component safety, and offshore pipeline safety. The Applicant will comply with all applicable laws and regulations designed to promote the safety and security of the proposed West Delta DWP. In addition to complying with these laws and regulations, the Applicant intends to implement the following mitigation measures to enhance safety and security at the DWP site:

- The Applicant would petition the USCG to establish a safety zone, area to be avoided, and no anchoring area, per the procedures outlined in 33 CFR 150, Subpart J, and the International Maritime Organization guidelines at least 1 year prior to commencement of construction;

- The Applicant would include in its OPMAN specific requirements describing the manning and operation of the DWP's control room and/or operations center describing how vessel traffic in the DWP's vicinity would be monitored visually and/or by radar;

- The Applicant would include in its OPMAN specific instructions on how any violation or potential violation of the DWP safety zone would be handled. Such instructions would include procedures for advising such vessels via VHF radio or loudhailer from the West Delta DWP or its support vessels to depart from the designated safety zone;

- The Applicant would include in its OPMAN specific instructions requiring West Delta DWP personnel to broadcast an emergency call on appropriate VHF frequencies advising nearby vessel traffic of any release or potential release of LNG cargo from the DWP and to depart from the terminal area;

- Prior to commencement of operations, the Applicant would develop and implement a pipeline procedures manual providing specific guidance on the operation, maintenance, and emergency response measures for the natural gas pipeline associated with the West Delta DWP in consultation with U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration and BSEE (49 CFR 192.605); and

- The Applicant would maintain a safety risk management program throughout all phases of Project development.

Section 13 – List of Preparers

Section 13 includes a table listing all individuals and entities involved in the development of the DPLA for the offshore components of the Project.

27.2 Onshore Gas Pretreatment and Supply Components

Volume IIb, "Onshore Project Components" of this DPLA includes: (1) an introduction and project description, (2) seven environmental resource sections, and (3) a list of preparers, as well as appendices containing supplemental baseline studies relevant to the onshore portion of the proposed Project. The general outline of Volume IIb is detailed below in Table 27-2. Additionally, a brief summary of each section in Volume IIb is provided below.

Table 27-2
Content of Volume IIb, Onshore Project Components

Section	Content
1	Project Description, and Purpose and Need
2	Water Quality and Use
3	Land Cover and Vegetation
4	Wildlife and Protected Species
5	Cultural Resources
6	Soils and Geologic Resources
7	Land Use, Coastal Zone Use, Recreation, and Aesthetics
8	Meteorology, Air Quality, and Noise
9	List of Preparers
Appendix	**Content**
A	Workspace and Resource Mapping
B	USGS Topographic Map Route Series
C	Onshore Pipeline Construction Best Management Practices
D	Horizontal Directional Drill Contingency Plan

Table 27-2
Content of Volume IIb, Onshore Project Components

E	Construction Spill Response Plan for Oil and Hazardous Substances
F	Landowner List (*Confidential*)
G	Wetland Delineation Report
H	Threatened and Endangered Species Survey Report
I	Cultural Resources Assessment (*Confidential*)
J	Unanticipated Discoveries Plan – Onshore Components
K	Emissions Calculations for Onshore Construction
L	Operational Emissions Calculations for Onshore Stationary Sources

Section 1 – Project Description, and Purpose and Need

Section 1 of Volume IIb includes a detailed description of the onshore Project components and the associated construction and installation, operation, and decommissioning stages.

Section 2 – Water Quality and Use

Section 2 describes the regulatory environment surrounding sensitive waterbody and wetland resources that may be affected by the onshore Project components. This section also includes information on existing water quality and use, potential environmental impacts due to construction and operation of the Project, and proposed minimization and mitigation measures for the onshore portion of the Project.

Groundwater resources crossed by the Project would include the aquifer system and water supply wells. The principal aquifer underlying the onshore Project component area is the Coastal Plains aquifer system. Within Plaquemines Parish, due to the relative level of total suspended solids, there are limited sources of fresh groundwater. Shallow aquifers may have limited sources of fresh groundwater, including point-bar and natural levee deposits along the Mississippi River. However, most of the groundwater available in Plaquemines Parish is saline. Aquifers in Plaquemines Parish are recharged by rainfall, seasonally from the Mississippi River, and natural leakage from adjacent aquifers (i.e., by natural flow into rivers or canals). Groundwater withdrawal is low in Plaquemines Parish, with surface water sources accounting for almost all water withdrawal. Groundwater is used for industrial purposes, public supply, rural domestic uses, and livestock. The nearest USEPA-designated sole source aquifers are the Southern Hills Regional Aquifer system in eastern Louisiana and southern Mississippi. According to the Louisiana Department of Natural Resources Strategic Online Natural Resources Information System, the nearest recorded water supply well is located at Venice Marina, approximately 1.1 statute miles (1.8 kilometers) from the nearest onshore Project component workspace.

The Mississippi River is the primary source of fresh water in Plaquemines Parish; it provides the majority of the parish's public water supply and is the source for the majority of the parish's industrial water withdrawals. The dominant hydrologic features of the onshore Project components are a mosaic of shallow open water expanses, extensive wetlands (marshland), and access channels cut through the marshland. The onshore Project components would be located in Hydrologic Unit Code (HUC) Region 08 – Lower Mississippi and Subregion HUC 0809 – Lower Mississippi, which signify broad drainage systems. Most of the onshore Project component area is in the Central Louisiana Coastal subbasin (HUC 080903), while a small portion occurs in the Lower-Mississippi-New Orleans subbasin (HUC 080901). Major waterbodies in the Central Louisiana Coastal subbasin include the southern portion of the Atchafalaya Basin, Terrebonne Bay, Barataria Bay, Lake Salvador, Little Lake, and Black Bay. Major waterbodies in the Lower-Mississippi-New Orleans subbasin include waters south of Venice, Louisiana, including the Mississippi River Delta and West Bay. The area has little topographic relief and receives

inputs from rainfall and groundwater inflow. Nourishing sediment inputs to the coastal systems have been affected by the establishment of flood levees along the Mississippi River.

Section 2 also includes information on state water quality classifications and sensitive surface waters. Louisiana Administrative Code 33:IX.Chapter 11, Surface Water Quality Standards, defines Louisiana's water quality standards. The regulation defines water use designations within the West Delta DWP, which include Agriculture, Drinking Water Supply, Fish and Wildlife Propagation, Outstanding Natural Resource Waters, Oyster Propagation, Primary Contact Recreation, and Secondary Contact Recreation water use. No designated Louisiana Natural and Scenic Rivers are located within the onshore Project component area. The closest designated river is the Bayou des Allemends, over 60 statute miles (96.5 kilometers) northwest of the onshore Project component area. There is only one designated National Wild and Scenic River in Louisiana, Saline Bayou, which is located over 250 statute miles (402.3 kilometers) northwest of the onshore Project components in Natchitoches Parish, Louisiana.

A wetland delineation was performed in April 2019, to identify wetlands within a 300-foot (91.4-meter) survey corridor for the onshore Project components. A wetland delineation report was completed to detail the findings from the wetland delineation and is provided in Volume IIb, Appendix G, "Wetland Delineation Report." A review of Federal Emergency Management Agency National Flood Insurance Rate Maps shows that the onshore Project component workspaces would cross floodplains that include Special Flood Hazards V21 and A16.

Construction and installation, operations, potential upsets/accidents, and decommissioning activities are expected to have negligible to moderate impacts on water and sediment quality within the Project area, as all modifications for the proposed Venice Pretreatment Plant and pipeline pig launcher would occur within an area that is already developed and maintained. Avoidance and minimization measures would further mitigate any potential impacts, along with the implementation of Volume IIb, Appendix E, "Construction Spill Response Plan for Oil and Hazardous Substances," and Appendix C, "Onshore Pipeline Construction Best Management Practices.". Upon decommissioning of the existing Venice Pretreatment Plant, the Applicant would seek to remove the Project's industrial facilities, including all artificial land coverings such as asphalt and gravel. This would allow workspaces to revert to preexisting, undeveloped conditions, including areas of open water. At the time of decommissioning the onshore pipeline and the proposed 30-inch in-field pipeline header, the Applicant would seek to clean and abandon the pipeline in place, which may result in temporary but negligible impacts on water and sediment resources and quality due to pipeline cleaning activities. However, once the pipeline is abandoned in place, there would be no negative impacts on water resources as all ground disturbance and in-water work associated with onshore Project component operation would cease.

Section 3 – Land Cover and Vegetation

Section 3 defines the existing environment for the proposed onshore Project components in regard to land cover and vegetation. This section also includes applicable regulations, potential environmental impacts resulting from construction and operation, and proposed minimization and mitigation measures as they apply to land cover and vegetation.

The Project would be located within the two main ecoregions: Level III Mississippi Alluvial Plain Ecoregion and Level IV Deltaic Coastal Marshes and Barrier Islands Ecoregion. The Level III region is composed of riverine habitat with mostly broad, flat alluvial plains with levees, swales, and river terraces. Soils in the Level III region are characterized as generally finer textured and poorly drained compared to the soils of adjacent ecoregions, although it contains some areas with better drained, coarser soils. The wetlands in this ecoregion are important for migratory waterfowl winter habitat. Most of the ecoregion is used for agricultural purposes, with natural vegetation having been cleared and ditches having been dug for drainage. The Level IV region is dominated by brackish and saline marshes, with tolerant vegetation

including saltmarsh cordgrass (*Spartina alterniflora*), marshhay cordgrass (*Spartina patens*), black needlerush (*Juncus roemerianus*), and coastal saltgrass (*Distichlis spicata*). The marshes and wetlands within this ecoregion act as a buffer that helps to moderate tidal inundation and flooding due to storm events.

Vegetation habitats that would be crossed by the onshore portions of the Project, as classified based on the Louisiana Department of Wildlife and Fisheries and a site-specific wetland delineation, include batture, brackish marsh, coastal dune grassland/shrub thicket, developed, open water, and salt marsh. Section 3 describes these habitat types and the dominant vegetation included in each. This section also details existing noxious and invasive plant species based on desktop and site-specific field analysis. Aquatic plant species not listed by the Natural Resources Conservation Service but recognized by the State of Louisiana as invasive include alligator weed (*Alternanthera philoxeroides*), common salvinia (*Salvinia minima*), giant salvinia (*Salvinia molesta*), hydrilla (*Hydrilla verticillata*), and water hyacinth (*Eichhornia crassipes*). Federal and/or state-listed noxious and invasive plants observed during the April 2019 field surveys within or in proximity of onshore Project component workspaces include Chinese tallow, alligator weed, and water hyacinth.

Overall impacts on land cover and vegetation from construction, installation, operation, and decommissioning of the onshore Project components are expected to be temporary and negligible (with some negligible to moderate impacts) based on the proposed activities and the application of mitigation measures. Potential impacts resulting from construction and installation include vegetation clearing, grading, and inadvertent spills from construction equipment or vehicles, or inadvertent spills due to HDD installation. Impacts on land cover and vegetation due to vegetation clearing and grading are expected to be negligible and moderate, depending on the extent and duration of clearing and grading activities and the preexisting vegetation types. Impacts from inadvertent spills from construction equipment or vehicles or due to HDD installation are expected to be temporary, reversible, and negligible based on implementation of Volume IIb, Appendix D, "Horizontal Directional Drill Contingency Plan" and, if necessary, the cleanup measures described in this plan.

In general, vegetation clearing and grading due to maintenance activities would also be temporary in nature, and land cover and vegetation would be allowed to reestablish after maintenance activities are complete. And, once facilities are removed, operational easements would be allowed to revert to preexisting vegetation conditions. After decommissioning, maintenance activities would cease and no ground disturbance would occur, allowing for unhindered vegetation growth and potential positive impacts on vegetation and land cover.

Section 4 – Wildlife and Protected Species

Section 4 describes the regulatory environment associated with various wildlife and protected species that may be affected by the onshore Project components. This section also discusses potential environmental impacts due to construction and operation, and proposed minimization and mitigation measures for the onshore Project components.

The species discussed in Section 4 are broken into four major categories: terrestrial wildlife, migratory birds, managed and sensitive habitats, and threatened and endangered species. Wildlife likely to be present within the Project area include meadowlark (*Sturnella* spp.), cottontail rabbit (*Sylvilagus* spp.), red fox (*Vulpes vulpes*), field sparrow (*Spizella pusilla*), and bobwhite quail (*Colinus virginianus*). Woodland areas within Plaquemines Parish also provide habitat for wild turkey (*Meleagris gallopavo*), squirrels (*Sciuridae* spp.), raccoon (*Procyon lotor*), deer (*Cervidae* spp.), woodpeckers (*Picidae* spp.), gray fox (*Urocyon cinereoargenteus*), woodcock (*Scolopax* spp.), and thrushes (*Turdidae* spp.). Additionally, wetland, marsh, and swampy areas within Plaquemines Parish provide habitat for various species of ducks,

geese, shore birds, herons, muskrat, and mink. During 2019 site-specific surveys, the following wildlife were observed: anhinga (*Anhinga anhinga*), laughing gull (*Leucophaeus atricilla*), roseate spoonbills (*Platalea ajaja*), green heron (*Butorides virescens*), American alligator (*Alligator mississippiensis*), Caspian tern (*Hydroprogne caspia*), common tern (*Sterna hirundo*), willet (*Tringa semipalmata*), plover *(Charadriinae* spp.), limpkin (*Aramus guarauna*), osprey (*Pandion haliaetus*), common moorhen (*Gallinula chloropus*), and nutria (*Myocastor copyus*). All potential migratory bird species and birds of conservation concern within the Project area are identified in Section 4 at three distinct geographic scales: National, U.S. Fish and Wildlife Service Regions, and Bird Conservation Regions.

Section 4 also outlines sensitive habitats within the Project area or in the vicinity of the Project area. The nearest Wildlife Management Area (WMA), the Pass-a-Loutre WMA, is located approximately 6 statute miles (9.7 kilometers) southeast of the proposed Venice Pretreatment Plant and onshore pipeline. This WMA is characterized by river channels and freshwater marshes.

Based on a review of U.S. Fish and Wildlife Service's Information for Planning and Conservation tool, eight wildlife species currently listed under the federal Endangered Species Act were identified as having the potential to occur within a 0.5-statute-mile (0.8-kilometer) buffer of the onshore Project components. State-listed species with the potential to occur within Plaquemines Parish were are also outlined in Section 4 based on the Louisiana Department of Wildlife and Fisheries' species by parish list. There are six state-listed species with a threatened or endangered status within Plaquemines Parish, two of which are also listed under federal regulations.

Impacts on wildlife resources from construction, operation, and decommissioning of the onshore Project components are expected to be negligible to moderate based on the proposed activities and the application of the mitigation measure. Impacts on wildlife due to construction and installation activities due to impacts on wildlife habitat may include disruption, fragmentation, modification, and loss of habitat; temporary displacement of wildlife; behavioral changes; increased competition and predation among wildlife species in proximity of the onshore Project components; wildlife mortality; and temporary impacts on wildlife due to construction noise, lighting, and traffic. In addition, inadvertent release of drilling mud/fluid due to HDD installations could occur. Operational impacts on wildlife would include temporary impacts on habitat due to operational maintenance activities, as required. These impacts would be localized and temporary, and are not anticipated to require large areas of ground disturbance. Decommissioning impacts on wildlife would be negligible. Habitat within onshore Project component workspaces would be restored, and areas where facilities are removed would be allowed to revert to preexisting conditions during decommissioning. In addition, operational maintenance activities would cease and, therefore, all ground disturbance would cease allowing vegetation to reestablish unhindered and allowing for wildlife habitat to be restored.

Section 5 – Cultural Resources

Section 5 provides information on the types of cultural resources generally found within the existing environment, existing geological matrices, specialized techniques used to identify terrestrial cultural resource sites, and the results of cultural resources surveys that have occurred within the Project's APE.

To understand potential cultural resources within the Project area, the existing geology and soil characteristics are discussed in Section 5; however, geology and soils are discussed in greater detail in Section 6. The Cultural Resources Section is then divided into prehistoric then historic context. After a little over 100 years of archaeological research, 13,000 years of human history in Louisiana have been broken down into nine distinctive cultural periods: the Pre-Projectile Point, Paleoindian, Archaic, Poverty Point, Tchefuncte, Marksville, Troyville-Coles Creek, Plaquemine, and Mississippian. Each of these is defined in

Section 5. That section also provides further historical context by detailing the European Entrada, Post-Bellum Recover and Oil, and River Community histories.

A desktop evaluation was conducted to identify previously recorded/identified cultural resources. This included a review of prehistoric and historic archaeological sites as well as aboveground structures. A Phase I cultural resources survey also was conducted to locate and identify cultural resources in the survey area that could be physically disturbed by Project-related activities. The methodology and results of these evaluations are included in Section 5.

Due to the region's extended land use history, the presence of human burials should be anticipated in association with both occupied and abandoned settlement sites, along trails and roadways, within shell middens, and even within inundated marshes and waterways. To date, no cemeteries have been identified within the proposed Project's APE.

Section 5 also provides a discussion of the potential impacts from the Project on cultural resources that may occur during construction and installation, upsets/accidents, and/or the decommissioning process. This discussion largely focuses on the potential to impact previously unrecorded/unidentified resources, as no known resources are present within the APE. While impacts would be unlikely to occur, the level of impacts would vary from negligible to significant depending on the individual characteristics of the unanticipated discovery.

The cultural resources data collected for the onshore pipeline are detailed as a draft report in Volume III, Attachment 3b, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," (*Confidential*). The Final Phase I Cultural Resources Survey of the West Delta to Venice Pipeline Project will be provided as a supplemental filing in Q4 2019.

Section 6 – Soils and Geologic Resources

Section 6 describes the overall geologic setting and geologic conditions associated with the Venice Pretreatment Plant and proposed onshore pipeline. This section also describes geophysical and geotechnical conditions, geologic hazards, and mineral resources at or near the proposed Venice Pretreatment Plant and onshore pipeline.

Soil descriptions and characteristics were compiled from the Natural Resources Conservation Service Soil Survey Geographic database and the Soil Survey of Plaquemines Parish, Louisiana. Section 6 assesses the following soil characteristics within the Project area: hydric soils, agricultural soils, flooding frequency class, ponding frequency class, risk of corrosion to concrete, risk of corrosion to steel, and potential environmental contamination. Onshore Project components would cross four unique soil map units: (1) Aquents, dredged, frequently flooded; (2) Balize and Larose soils; (3) Bellpass muck, 0 to 0.2 percent slopes, very frequently flooded; and, (4) Clovelly muck, 0 to 0.2 percent slopes, very frequently flooded.

The onshore Project area is underlain by Cretaceous to Quaternary terrigenous (marine deposits derived directly from adjacent land) sedimentary sequences dipping gently toward the Gulf of Mexico. The gulfward-dipping beds are a result of regional subsidence of the central portion of the Gulf of Mexico basin. Older/deeper sediments have a greater dip toward the center of the basin. The northern coastal plain extends from the Florida peninsula to the Rio Grande valley. The Mississippi River separates the eastern Gulf of Mexico plain from the western Gulf of Mexico plain, making the Mississippi River the most prominent feature in the northern coastal plain. The Mississippi River is responsible for the 500-mile (805-kilometer) northern extension of the coastal plain from southern Louisiana to southern Illinois known as the Mississippi Embayment. The Mississippi River is also responsible for the well-known 11,000-square-mile (28,000-square-kilometer) great deltaic complex, of which 1,800 square miles (4,700 square kilometers) of

sediment, known as the Mississippi fan, are submerged in the Gulf of Mexico. The Mississippi River has been flowing into the Gulf of Mexico since the Late Jurassic epoch. Geophysical surveys to help characterize the geology of the proposed onshore pipeline area have been conducted and are included in Volume III, Attachment 3, "Geophysical Archaeological and Hazard Survey for the Proposed Pipeline," (*Confidential*).

Section 6 also addresses geologic hazards and mineral resources. Potential geologic hazards include faults, salt diapirs, seismic hazards, soil liquefaction, landslides, shoreline change, tropical storms/hurricanes/storm surge, and tsunamis. Mineral resources such as active mines and mineral processing plants, industrial mineral-mining operations, active and abandoned mines, and oil and gas wells within 0.25 statute mile (0.4 kilometer) of the onshore storage/supply components were mapped using publicly available mineral resource information provided by the Mineral Resources Data System. The assessment revealed 33 oil and gas wells, 18 of which were identified as producing wells and the remaining as non-active wells and one unknown well. Two wells were identified within Project work spaces.

Impacts on soil and geologic resources due to construction and installation, operations, upsets/accidents, and decommissioning are expected to be negligible to moderate. Clearing, grading, and excavating activities would temporarily disturb native soils for installation of the onshore storage/supply components, and maintenance activities could involve disturbing the soil during mowing and/or vegetation removal within the operational easement. However, all potential impacts would be minor and/or temporary and would therefore be negligible.

Section 7 – Land Use, Coastal Zone Use, Recreation, and Aesthetics

Section 7 describes land use, coastal zone use, recreation areas, and aesthetics that may be affected by the onshore Project components. Section 7 also includes applicable regulations, the existing pre-development environment, potential environmental impacts due to construction and operation, and proposed mitigation measures for the onshore Project components.

The onshore Project components would be located in rural, marshy areas of southeastern Louisiana. Land use data provided in this section were derived from the 2007 Louisiana Speaks Regional Plan for south Louisiana. To produce the land use data, the planning team for the regional plan interpreted and digitized data from U.S. Geological Survey aerial photographs and hand-coded land uses based on the interpretation of the photographs. Land use types that would be crossed by the onshore Project components in Plaquemines Parish include "Industrial" and "Undeveloped," and the mileage of each crossed by each onshore Project component is included in Section 7. The number of road crossings and distances of road crossed by each Project component are also detailed in Section 7.

The proposed Project pipelines would be located entirely within the Louisiana coastal zone boundary. Additionally, the Venice Gas Complex, where modifications for the Venice Pretreatment Plant would occur, is also located within the Louisiana coastal zone boundary.

The onshore Project components would not cross or impact any Louisiana state agency lands, National Conservation Easement database lands, Louisiana State Parks, WMAs, U.S. Fish and Wildlife managed lands, or any other local, state, or federally managed lands. The nearest public land or recreation area to the onshore Project components is a small, separate portion of the Delta National Wildlife Refuge (located approximately 2.70 statute miles [4.35 kilometers] northeast of the Venice Gas Complex). Other than the Delta National Wildlife Refuge, the only other public land or recreation area in the vicinity of the onshore Project components is the Pass-a-Loutre WMA. The wildlife management area is located directly southeast of the Delta National Wildlife Refuge and includes the furthest edges of the Mississippi River Delta. At its closest point, the Pass-a-Loutre WMA is located approximately 8.35 statute miles (13.44 kilometers) from the proposed 30-inch in-field pipeline header.

The onshore Project components would be located in a rural, coastal area of Plaquemines Parish, Louisiana. No residential areas or structures are located within 0.25 statute mile (0.40 kilometer) of any of the onshore components. The closest residential area to the Venice Gas Complex is located approximately 1.4 statute miles (2.3 kilometers) northeast. In addition to this housing area, rental cabins are also located within the Venice Marina (the nearest unit is approximately 1 statute mile [1.6 kilometers] east of the Venice Gas Plant). The Venice Gas Complex contributes to the somewhat industrial nature of the area. Primary sensitive receptors to visual impacts in the area of the proposed onshore Project components are residents and visitors to the Venice Marina and recreational users accessing the numerous waterways for recreational fishing and boating.

Negligible to nonexistent impacts on land use, coastal zone use, recreation areas, and aesthetics are anticipated during construction, operations, upsets and accidents, and decommissioning of the onshore Project components. Construction impacts would include land clearing and grading due to installation. Impacts from land clearing and grading are anticipated to be negligible.

Section 8 – Meteorology, Air Quality, and Noise

Section 8 describes existing conditions related to meteorology, air quality, and noise; applicable regulations; and impacts on air quality and noise for the onshore portion of the Project.

The general climate of the Gulf Coast of Louisiana is humid subtropical and is influenced by the Gulf of Mexico. Prevailing winds from the south-southeast bring moisture from the Gulf of Mexico but provide a mild climate. The regional climate along the Louisiana Gulf Coast is represented by the National Climatic Data Center for Boothville-Venice, Louisiana. Data from this station from 1965 to 2018 are included in Section 8. Data from air quality monitoring stations in Louisiana nearest to the onshore Project site were additionally used to characterize the background air quality. These stations tend to represent area-wide ambient air quality conditions rather than localized impacts. The Project area lies within the Atlantic Basin, which includes the Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico. The hurricane season in this basin occurs from June 1 to November 30. Hurricanes are a constant threat during the summer and fall seasons. Annual average wind direction is from the southeast, and annual average wind speed is about 11 miles per hour (17.7 kilometers per hour).

All Gulf of Mexico coastal parishes in Louisiana (including Plaquemines, the location of the onshore Project site) meet the NAAQS for nitrogen dioxide, sulfur dioxide, carbon monoxide, ozone, particulate matter, and lead. The LDEQ and USEPA assess the need for lead monitoring based on the location of potential sources of lead emissions to determine if lead monitoring would be necessary. In this region, there are no significant sources of lead emissions, and with lead additive removed from gasoline many years ago, the USEPA and LDEQ have determined that lead monitoring is not needed and that a sound basis exists to determine that the area is in attainment for the lead NAAQS. Significantly distant from the onshore Project site, but within Louisiana, parishes encompassing Baton Rouge were previously in moderate nonattainment of the 1997 8-hour ozone standard. These parishes have been re-designated as attainment and are subject to an ozone air quality maintenance plan.

The nearest Federal Class I area is the Breton National Wildlife Refuge, Plaquemines Parish, in southeast Louisiana, which is approximately 20 statute miles (32.3 kilometers) from the onshore Project site. Due to the distance separating the onshore Project site from the Class I area, an evaluation of impacts at the Breton National Wildlife Refuge may be required by the LDEQ as part of the air permitting process. The nearest Class II Park, the Delta National Wildlife Refuge, is located approximately 11 statute miles (18 kilometers) east of the onshore Project site. An evaluation of impacts at the Class II National Wildlife Refuge would be provided as part of the LDEQ air permit application for permitting of the proposed Venice Pretreatment Plant. An onshore permit application would be submitted in late Q3 2019 or Q4 2019.

There are no federal, state, or local noise ordinances applicable to the onshore Project site. Existing environmental noise levels vary depending on land use. Typical ambient noise levels based on land use category are provided in Section 8. Additionally, a desktop study to identify noise sensitive areas (NSAs) was performed as part of the noise evaluation for the area near the onshore Project site, including HDD entry and exit locations along the onshore pipeline route, using geographic information system imagery. The search was performed to identify schools, parks, medical facilities, and nursing homes within 0.5 statute mile (0.8 kilometer) of the proposed onshore pipeline and within 1 statute mile (1.6 kilometers) of the proposed Venice Pretreatment Plant. No potential NSAs were found as a result of the desktop study conducted by the Applicant.

Air pollutant emissions from pipeline construction would be temporary and transient along the proposed onshore pipeline route and would not significantly affect any single location for more than a few days. In the vicinity of the proposed Venice Pretreatment Plant, emissions would be continually produced during construction, would cease when construction is completed, and are not expected to affect local air quality. During operation of the onshore facilities, emissions would be produced primarily at the Venice Pretreatment Plant. Operation of the Venice Pretreatment Plant would likely be governed by a Part 70 (Title V) air operating permit. Emissions would be produced by operation of the pipeline only during venting resulting from pigging operations.

Noise produced during construction of onshore components may temporarily increase ambient noise levels at the HDD entry and exit sites. This noise would cease upon completion of construction. Due to the remote location of the site, there are no NSAs within 1 statute mile (1.6 kilometer) of the onshore components, and mitigation measures would not be used.

Section 9 – List of Preparers

Section 9 includes a table listing all individuals and entities involved in the development of the onshore components of the DPLA.

27.3 Consequences Assessment Methodology

The following consequences assessment methodology was used in the Environmental Resources Evaluation included in the resource sections in Volumes IIa and IIb, and it is consistent with NEPA and Council on Environmental Quality requirements. The assessment criteria are summarized in Table 27-3 for the purposes of identifying, classifying, prioritizing, and ranking potential consequences resulting from various stages of Project activities.

Table 27-3
Assessment Criteria

Criteria	Values
Type	Positive or Negative
Nature	Direct or Indirect
Likelihood	Unlikely, Potential, or Likely
Duration	Temporary or Long-term
Reversibility	Reversible or Irreversible
Significance	Significant, Moderate, or Negligible

In general, the criteria identified in Table 27-3 are defined as follows:

- **Type:** The net effect of a consequence. This criterion includes identifying those consequences that can act synergistically or antagonistically with others
  - Positive: Net benefit to the resource
  - Negative: Net loss to the resource
- **Nature:** The origin/source of an effect/consequence.
  - Direct: Immediate consequence of a proposed action
  - Indirect: Secondary consequence of a proposed action
- **Likelihood:** The probability for a consequence to occur.
  - Unlikely: Low probability
  - Potential: Possible or probable
  - Likely: Certain
- **Duration**: The temporal context of a consequence.
  - Temporary: A consequence lasting weeks to months
  - Long-term: A consequence lasting years to decades
- **Reversibility:** The natural capacity of the environment to restore itself after the action ceases.
  - Reversible: Consequences are reversible
  - Irreversible: Consequences are permanent
- **Significance:** The overall level of magnitude. The magnitude and significance of the consequence resulting from the interaction between an element/action of the Project with the environment and/or socioeconomic context depends on how, where, when, and with what frequency or likelihood this consequence occurs. The overall significance assigned to a particular effect is based on actual measurable criteria (through use of models and comparison with regulatory thresholds) and/or best professional judgment (when solid and defensible conclusions can be reached by comparing with agency-endorsed publications and/or published science). When there is a potential for consequence, but insufficient information to determine significance, the discussion is limited to a short paragraph stating such. In general, the overall significance levels are dependent on the synergistic effect of the duration and the intensity of the consequence, and are defined as follows:

  - Significant: A significant consequence corresponds to an effect on a substantive area of any environmental or socioeconomic condition, with sufficient intensity and duration to generate significant change(s), and predominantly irreversible by natural means. The consequence could vary in duration (short-term to long-term) if the intensity is severe enough to warrant a notable effect.
  - Moderate: A moderate consequence is an effect on a portion of any environmental or socioeconomic condition area. The effect may occur for a limited period, or is naturally reversible, or the site condition affected is temporarily altered.
  - Negligible: A negligible consequence corresponds to an effect that is barely perceptible, generates naturally reversible changes in the short term, and does not diminish or alter the site condition. Temporary and long-term consequences could be negligible if the severity is minimal enough to not cause noticeable effects.

27.4 Cumulative Impacts

To facilitate NEPA analysis, a framework for cumulative impact assessment is included in Volume IIa, Appendix B, "Framework for Cumulative Impacts Analysis – Offshore and Onshore Components." Cumulative impacts are addressed in the resource sections in Volumes IIa and IIb. Cumulative impacts are the collective result of the incremental impacts of an action that, when added to the impacts of other past, present, and reasonably foreseeable future actions, would affect the same resources, regardless of what agency or person undertakes those actions (40 CFR 1508.7). Cumulative impacts can result from actions that, individually, have minor impacts but that, collectively, impose significant impacts over a period of time. Compliance with NEPA requires an analysis of cumulative impacts (40 CFR 1508.25(a)(2) and 40 CFR 1508.25(c)(3)).

28 §148.105(aa) Aids to Navigation

28.1 148.105(aa)(1) Proposed Aids to Navigation

In accordance with USCG regulations for aids to navigation, the West Delta DWP would be marked with warning lights and fitted with foghorns to warn all marine vessels in the vicinity of the DWP. Two "phases" of aids to navigation would be used: the first (initial installation) phase would include one temporary set of aids installed on the jackets; the second (final installation) phase would include permanent aids installed on the platform decks.

Volume I, Appendix D, "Summarized Basis of Design," (public version), and Volume III, Attachment 13, "Marine Basis of Design," (*Confidential*), provide illustrations of the navigational aids that would be implemented at the West Delta DWP. Coordinates for the proposed aids to navigation are incorporated as part of the platforms and included in Table 7-1, above.

28.2 148.105(aa)(2) Obstruction Lights and Rotating Beacons

In addition to working deck lights for illumination of equipment and facilities on the West Delta DWP, fixed navigation lights would be installed, as required by 33 CFR 67 and the USCG. Navigation warning lights would be installed on each structure. Structures with a maximum horizontal dimension of 30 feet (9.1 meters) or less would have one (1) obstruction light mounted so it is visible from all directions (360º viewable). Structures having a horizontal dimension greater than 30 feet (9.1 meters) and less than 50 feet (15.2 meters) would have two (2) obstruction lights mounted diagonally across from each other. Structures having a horizontal dimension equal to or greater than 50 feet (15.2 meters) would have obstruction lights mounted on each corner. The color of the optic would be white and would display a quick-flash characteristic of approximately 60 flashes per minute, synchronized with all other navigation warning lights at the DWP. The lights would be displayed not less than 20 feet (6.0 meters) above the mean high water mark and would have a range of at least 5.0 nautical miles (5.8 statute miles, or 9.3 kilometers). Volume I, Appendix D, "Summarized Basis of Design," (public version), and Volume III, Attachment 13, "Marine Basis of Design," (*Confidential*), provide illustrations of the obstruction lights and rotating beacons that would be implemented at the DWP. Coordinates for the proposed obstruction lights and rotating beacons are incorporated as part of the platforms and included in Table 7-1, above.

28.3 148.105(aa)(3) Sound Signal

The West Delta DWP would have a coordinated sound signal, based on multiple foghorn locations, with a rated range of at least 2 nautical miles (2.3 statute miles, or 3.7 kilometers). The sound signal would operate when visibility in any direction is less than 5 nautical miles (5.8 statute miles, or 9.3 kilometers). Volume I, Appendix D, "Summarized Basis of Design," (public version), and Volume III, Attachment 13, "Marine Basis of Design," (*Confidential*), provide illustrations of the sound signals that would be implemented at the DWP. Coordinates for the proposed sound signals are incorporated as part of the platforms and included in Table 7-1, above.

28.4 *148.105(aa)(4)* Each Proposed Buoy

No navigation buoys are proposed as part of the West Delta LNG Project. The DWP safety zone would be shown on navigation charts but not marked with any perimeter buoys or other navigational aids.

28.5 *148.105(aa)(5)* Radar Beacon (RACON)

At least two (2) radars with AIS capability, one short-range and one long-range, would be installed to clearly view the area around the West Delta DWP. In addition, a redundant RACON would be installed and, when triggered by a ship's radar, would transmit a distinctive signal that would appear on the display of the triggering radar, providing range, bearing, and identification information. The short-range radar would be capable of covering the medium to short ranges, from 12 statute miles (19.3 kilometers) down to 1 statute mile (1.6 kilometers). This radar would monitor all vessels operating and/or transiting in the vicinity of the DWP. This unit would operate continuously and monitor potential suspicious vessels that may enter the DWP security zone. The unit would also monitor all marine traffic in the area, advising, as necessary, the approaching or departing LNG trading carriers for berthing or anchoring. The long-range radar would be capable of covering the long to medium ranges, from 30 statute miles (48.3 kilometers) down to 12 statute miles (19.3 kilometers). This radar would monitor all marine vessels within a 30-statute-mile (48.3-kilometer) radius and advise the approaching or departing LNG trading carriers of other marine traffic and deviations from the navigational routes to the DWP. The displays of each radar would be overlaid with the security zone, approach corridor, and anchorages. This would enable the operators to monitor the progress of approaching vessels and to assist, as required, with navigation information, particularly in cases of reduced visibility.

29 §148.105(bb) National Pollutant Discharge Elimination System

29.1 Section 402 of the Clean Water Act, National Pollutant Discharge Elimination System, Offshore Water Discharge Permit

Under the CWA, the USEPA has authorization to issue a NPDES permit for discharges to waters of the United States from an offshore facility, and, therefore, a NPDES permit would be required for operation of the proposed West Delta DWP. The LDEQ is the designated environmental agency for the state of Louisiana for implementation of the NPDES program in state surface water and stormwater discharges, both from industrial and municipal wastewater facilities; however, the NPDES permit application for the West Delta DWP offshore components would be submitted to USEPA Region 6. An unsigned, draft form of the NPDES permit application that would be submitted to USEPA Region 6 for the West Delta DWP offshore components is included in Volume I, Appendix C, "U.S. Environmental Protection Agency National Pollutant Discharge Elimination System Permit Application").

29.2 Section 401 of the Clean Water Act, Water Quality Certification

Section 401 of the CWA, WQC, provides states with the responsibility to protect water quality by requiring them to address the aquatic resource impacts of federally issued permits and licenses. Under Section 401, a federal agency cannot issue a permit or license for an activity that may result in a discharge to waters of the United States until the state from which the discharge would originate has granted or waived a WQC. In discharges outside state waters, the USEPA grants the Section 401 WQC. In Louisiana and its state waters, the LDEQ has been delegated the authority to issue a WQC.

30 §148.105(cc) Placement of Structures and the Discharge of Dredged or Fill Material

The USACE's permit authority is derived from Section 10 of the U.S. Rivers and Harbors Act of 1899, Section 404 of the CWA, Section 103 of the Marine Protection, Research, and Sanctuaries Act, and Section 4(f) of the Outer Continental Shelf Lands Act. These acts give the USACE jurisdiction over all waters of the United States.

The West Delta LNG Project falls under the jurisdiction of the New Orleans USACE District. District specialists evaluate requests for permits for construction work in, on, or over navigable waters, and for disposal of dredged materials. A single USACE permit is required, which covers both statutory authorities (Section 10 of the Rivers and Harbors Act, as well as Section 404 of the CWA). Section 10 regulates navigable waters, and is required for any constructed structure (i.e., anchor piles, anchor chains, risers, manifolds, pipelines, mudmats) for the entire Project. Section 404 regulates any disturbance to substrate from Project construction and operation within waters of the United States, as defined by the CWA. USACE Section 10/Section 404 approval is anticipated to be required for construction of the DWP components described above. An unsigned, draft copy of the USACE Section 10/Section 404 permit application that would be submitted for the West Delta LNG Project is included in Volume I, Appendix B, "U.S. Army Corps of Engineers/Louisiana Department of Natural Resources Joint Permit Application for Work within the Coastal Zone."

A water quality certification under Section 401 of the CWA would be required for the dredging and disposal of dredged material into waters of the United States (as well as for permitted discharges as described in Section 10 and 29). Section 401 of the CWA requires that before a federal agency can issue a license or permit for construction or other activity, it must have received from the state in which the affected activity would take place a written certification that the activity would not cause or contribute to a violation of relevant state water quality standards. Water Quality Certificates in the state of Louisiana are not issued as individual documents. They are "folded in" or included in the Section 404 Permit, as described above in Section 10 (see Volume I, Appendix B, "U.S. Army Corps of Engineers/Louisiana Department of Natural Resources Joint Permit Application for Work within the Coastal Zone"). CWA provisions to which Section 401 certification applies include the Section 10/404 permit from the USACE and the NPDES permit from the USEPA. Information required to obtain a USACE Section 10/404 permit is provided in the draft application in Appendix B.

31 §148.105(dd) Additional Federal Authorizations

As the lead agencies for administration of the DWPA, the USCG and MARAD are responsible for the proposed West Delta LNG Project's license application processing and issuance, and compliance with National Environmental Policy Act (NEPA) and the provisions of other environmental laws that require consultations with federal and state agencies concerning specific environmental resources. While consultations with federal and state agencies may occur concurrently with the NEPA evaluation, permits and approvals constituting major federal action are not issued or obtained until the environmental impacts and all necessary plans to avoid, minimize, and mitigate adverse effects have been evaluated and the NEPA review has been completed.

The draft applications for the USACE permit and the USEPA NPDES permit are included in Volume I, Appendix B, "U.S. Army Corps of Engineers Section 10/404 Permit Application/Coastal Zone Consistency Form" and Appendix C, "U.S. Environmental Protection Agency National Pollutant Discharge Elimination System Permit Application." Volume I, Appendix F, includes the "U.S. Environmental Protection Agency Region 6 Prevention of Significant Deterioration Air Permit Application," and Volume I, Appendix G, includes the "U.S. Environmental Protection Agency Region 6 Title V Air Permit Application." A summary of pertinent environmental laws and required federal and state permits, approvals, and consultations to construct, own, and operate an LNG DWP are provided in Volume IIa, Appendix C, "List of Permits and Approvals – Offshore and Onshore Components."

32 §148.105(ee)
Sworn Statement

Pursuant to the Deepwater Port Act of 1974, as amended, and implementing regulations at 33 CFR 148.105(ee), I, Peter Mercure, the undersigned, having been first duly sworn, as the Chief Operating Officer of West Delta LNG, LLC, attest that to the best of my knowledge, information and belief, the information in said application is true.

Peter Mercure
Chief Operating Officer
West Delta LNG, LLC

SWORN TO AND SUBSCRIBED BEFORE ME,
on this 1st day of August, 2019.

(Notary's official signature)

October 31, 2023
(Commission Expiration)

NOTARY SEAL