Deepwater Port License Application
Blue Marlin Offshore Port (BMOP) Project

Volume IIb – Onshore Project Components Environmental Evaluation (Public)
Topic Report 2: Water and Sediment Quality and Use

Submitted to:

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Deepwater Port License Application
Blue Marlin Offshore Port (BMOP) Project

Volume I:	General (Public), including Deepwater Port License Application and Appendices (*under separate cover*)
Volume IIa:	Offshore Project Components Environmental Evaluation (Public) (*under separate cover*)
Volume IIb:	**Onshore Project Components Environmental Evaluation (Public)** **(*herein*)**
Volume III:	Technical Information [***Confidential***] (*under separate cover*)
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ABBREVIATIONS AND ACRONYMS

Applicant	Blue Marlin Offshore Port LLC
ATWS	additional temporary workspace
bgs	Below ground surface
BMOP	Blue Marlin Offshore Port
BMPs	Best Management Practices
bph	barrels per hour
CALM	Catenary Anchor Leg Mooring
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWA	Clean Water Act
DWP	Deepwater Port
DWPA	Deepwater Port Act
E1UB	Unconsolidated Bottom
E2EM	Estuarine intertidal emergent
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESS	Estuarine Shrub Scrub
FEMA	Federal Emergency Management Agency
GICW	Gulf Intracoastal Waterway
GOM	Gulf of Mexico
HDD	Horizontal directional drill
HUC	Hydrologic Unit Code
ICWW	Intracoastal Waterway
IRC	Integrated Report Category
LAC	Louisiana Administrative Code
LDEQ	Louisiana Department of Environmental Quality
LDHH	Louisiana Department of Health and Hospitals
LDNR	Louisiana Department of Natural Resources
LDWF	Louisiana Department of Wildlife and Fisheries
LQ	living quarters
MARAD	United States Maritime Administration
mg/L	Milligrams per liter
MLV	Mainline valve
MARAD	U.S. Maritime Administration
MP	Milepost
NFPA	National Fire Protection Act
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NOAA	National Oceanic and Atmospheric Administration
NRI	Nationwide River Inventory
NWI	National Wetlands Inventory

OCS	Outer Continental Shelf
OD	Outer Diameter
PEM	Palustrine Emergent Wetland
PFO	Palustrine Forested Wetland
ppt	Parts per thousand
Project	Blue Marlin Offshore Port Project
PSS	Palustrine Scrub Shrub Wetland
PUB	Palustrine, Unconsolidated Bottom
PUBx	Palustrine, Unconsolidated Bottom, Excavated
R2UB	Riverine, Lower Perennial Unconsolidated Bottom
RCRA	Resource Conservation Recovery Act
RHA	Rivers and Harbor Act
ROW	right-of-way
SONRIS	Strategic Online Natural Resource Information System
SPAR	Spill Prevention and Response
SSA	sole source aquifer
TAC	Texas Administrative Code
TCEQ	Texas Commission of Environmental Quality
TDSHS	Texas Department of State Health Services
TMDL	total maximum daily load
TPWD	Texas Parks and Wildlife Department
TWDB	Texas Water Development Board
TSCA	Toxic Substances Control Act
U.S.	United States
USACE	United States Army Corps of Engineers
USCG	U.S. Coast Guard
USDOT	United States Department of Transportation
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VBT	Vent Boom Tripods
VLCC	Very large crude carriers
WC	West Cameron Lease Blocks
WMA	Wildlife Management Area

PROJECT FAST FACTS

General Project Terminology	
Applicant	Blue Marlin Offshore Port LLC
Project Name	Blue Marlin Offshore Port (BMOP)

BMOP Location and General Information	
Nederland Terminal (NT)	The location where the oil for BMOP originates. This is the existing Sunoco Partners Marketing & Terminals L.P. facility located in Nederland, Jefferson County, Texas
New 42-inch Pipeline	37.02 miles of 42-inch pipeline from NT to Station 501
Existing Mainline from Cameron parish Louisiana to WC 509	Cameron Parish, Louisiana Louisiana State Blocks: WC 11, 20, 21 OCS Blocks: WC 21, 44, 43, 58, 79, 78, 95, 114, 113, 132, 133, 148, 169, 170, 183, 196, 205, 212, 213, 224, 230, 241, 245, 246, 255, 258, 259, 266, 269, 276, 275, 277, 282, 408, 431, 432, 433, 456, 459, 482, 483, 484, 508, 509
Deepwater Port Location (Platform – CALM Buoys)	West Cameron Block 509 (WC 509) West Cameron 508 (WC 508) East Cameron 263 (EC 263)
Deepwater Port Water Depth	156 to 162 feet water depth
Loading Capacity	80,000 barrels per hour (bph)

BMOP Deepwater Port Components	
Existing Stingray Pipeline (Mainline)	One existing 36-inch Outer Diameter (OD) pipeline, approximately 104 miles long from Station 501 in Cameron Parish, Louisiana to WC 509. This line consists of the existing 36-inch OD subsea line from WC 509 to Station 701 and the existing 36-inch OD onshore line from Station 501 to Station 701.
Deep Water Port (DWP)	The offshore loading facility site located in WC 509, WC 508, and EC 263. The facilities consist of the existing WC 509 Platform Complex; two new PLEMs and CALM Buoys in WC 508 and EC 263; two new Crude Oil Loading Pipelines from the WC 509 Platform Complex to the PLEMs and the flexible hoses attached to the CALM Buoys. The WC 509 Platform Complex will be converted from gas service to oil and gas service. The converted platforms will support oil export and natural gas transportation.
WC 509 Platform Complex (509 Complex)	The existing WC 509 Platform Complex consists of three platforms and two Vent Boom Tripods (VBT). The WC 509A Platform is the natural gas gathering platform. This will also house the 36-inch riser and pig barrel of the crude oil Mainline. The WC 509B Platform currently is the natural gas compression and control platform. It houses natural gas compressors, separators, the Control Room and Platform Complex's utilities. The WC 509B Platform will continue to house the natural gas separation facilities and the Platform Complex's utilities. It will also house the crude oil Control Room, metering facilities, and pig barrels for the two Crude Oil Loading Lines. The WC 509C Platform is the Living Quarters (LQ) platform and will continue in that role. The WC 509 VBTs are utilized to bridge the natural gas vent piping to a point approximately 660 feet from the 509B Platform and will continue in this role for any planned and emergency natural gas blowdowns.

BMOP Deepwater Port Components	
WC 148 Platform	The existing WC 148 Platform will be converted from natural gas transportation service to oil transportation service. All gas piping facilities on the deck will be removed and replaced with new pipe and a new Mainline Valve (MLV). This valve will be able to be remotely operated.
Catenary Anchor Leg Mooring (CALM) System	There will be two floating Calm Buoys installed approximately 4,710 feet and 6,085 feet from the WC 509B Platform. The CALM Buoys will be installed with a minimum of 5,000 feet separation. Each Buoy will be moored in place with 6 or more anchor chains connected to engineered anchors installed at locations around the Buoy. Flexible hoses will be connected from the PLEMs to the Calm Buoys. Floating flexible hoses will also be connected to the CALM Buoy and, during loading, the opposite end will be connected to the ship. CALM Buoy No. 1 will be installed in WC 508 and CALM Buoy No. 2 will be installed in EC 263.
Crude Oil Loading Pipelines	Two 36-inch diameter pipelines from the existing WC 509B Platform to the PLEMs.
Pipeline End Manifold (PLEM)	One PLEM will be installed on the seafloor at each CALM Buoy. Each PLEM will be connected to a 36-inch Crude Oil Loading Pipeline from the WC 509B Platform and a CALM Buoy floating above the PLEM. The two PLEMs will be in WC 508 and EC 263.
VLCC or other Crude Carrier	Very Large Crude Carriers (VLCCs), Suezmax, Aframax or other large capacity seafaring vessels.
Meter for Measuring Departing Crude Oil	The DWP will have two-meter stations with associated prover and lab facilities. One of the meter stations will be located at the new BMOP Pump Station adjacent to the NT and one will be located on the offshore crude export platform (WC 509B Platform).
Pre-fabrication Yards	Existing yards will be used along the northern Gulf of Mexico (GOM) coast.
Support Facility	An onshore support base will be established at an existing port facility to provide the necessary security to support the DWP operations.

BMOP Onshore Pipeline Components	
BMOP Pump Station	The onshore metering, pumping, and pig launcher station will be located in Nederland, Texas, adjacent to the existing NT.
Onshore Crude Oil Pipeline	A new, approximate 37.02-mile, 42-inch OD pipeline connecting the existing NT in Jefferson County, extending across Orange County, Texas to the existing 36-inch OD Mainline at Station 501 in Cameron Parish, Louisiana.
Station 501	The existing NGPL/Stingray interconnect facility (Station 501) will be abandoned and demolished. A new pig receiver and launcher will be installed to connect the new 42-inch OD onshore pipeline with the existing 36-inch OD onshore Stingray Mainline.
Station 701	The existing compressor Station 701 in Cameron Parish, Louisiana will be demolished. All existing natural gas equipment will be removed from the Station except for several large 10,000-barrel storage tanks. Approximately 1,000 feet of new 36-inch pipe, surge tanks, surge valves, and a new MLV will be installed. The existing 10,000-barrel tanks located at Station 701 will be converted to surge relief tanks.
Stingray ANR Tap Removal Site	BMOP will remove the tap and install 36-inch pipe in its place.

BMOP Onshore Pipeline Components	
Mainline Valves (MLV)	Six new MLVs will be installed within the permanent pipeline right-of-way (ROW) of the new build pipeline. MLVs will also be installed at the BMOP Pump Station, Station 501, and Station 701. These valves will be used for isolation and spill control purposes.
Pipeline Pig Launchers and Receivers	Pig Launchers/Receivers will be located at the BMOP Pump Station, Station 501, and the DWP. These are utilized for cleaning the pipelines and running intelligent devices to assess pipeline integrity.
Access Roads and Canals	The Project will utilize existing access roads and canals. One new temporary access road and four new permanent access roads will be required.
Pipe and Contractor Yards	BMOP will utilize existing facilities along the northern GOM coast, U.S. or international locations for manufacturing pipe and for fabricating the PLEMs, CALM Buoys, and end connectors. Pipe coating activities will be performed at existing facilities along the northern GOM coast. Selection of the marine contractor will be completed after the MARAD filing; however, the successful contractor(s) will utilize existing fabrication and logistical facilities located along the northern GOM coast.

PROJECT ENVIRONMENTAL EVALUATION ASSESSMENT CRITERIA

Environmental Evaluation Assessment Criteria		
Criteria	**Values**	**Definition**
Outcome	**Direct**	***Direct effects*** are "caused by the action and occur at the same time and place" of the Project (40 CFR § 1508.8).
	Indirect	***Indirect* effects** are "caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect impacts may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR § 1508.8). Indirect impacts are caused by the Project, but do not occur at the same time or place as the direct impacts.
	Cumulative	***Cumulative impact*** is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR § 1508.7).
Type	**Adverse (Negative)**	***Adverse*** would cause unfavorable or undesirable outcomes for the natural or social environment. Negative impacts result in a net loss to the resource.
	Beneficial (Positive)	***Beneficial*** impact would cause positive or desirable outcomes for the natural or social environment. Beneficial impacts result in a net benefit to the resource.
Duration	**Short-term (Temporary)**	***Short-term (or temporary)*** impacts are those that would occur only during a specific phase of the proposed Project, such as noise during construction or certain installation activities. Short-term impacts would end at the time, or shortly after, construction activities ceased. The duration of most short-term impacts would be a few hours to a few days.
	Long-term	***Long-term*** impacts would occur either continually or periodically throughout the life of the Project (e.g., operational air emissions, stormwater discharge), or would last for years after an impact-producing activity occurred (e.g., removal of wildlife habitat).
Magnitude	**Negligible**	***Negligible*** impacts are generally those that might be perceptible, but in certain cases may be undetectable.
	Minor	***Minor*** effects are those that could be perceptible but are of very low intensity and may be too small to measure.
	Moderate	***Moderate*** impacts are more perceptible, can often be quantified, and may approach the thresholds for major impacts.
	Major	***Major*** impacts, based on their context and intensity (or severity), have the potential to meet the thresholds for significance set forth in Council on Environmental Quality (CEQ) regulations (40 CFR § 1508.27). Major impacts warrant additional attention in a NEPA analysis and a review of potential mitigation measures that would fulfill the policies set forth in NEPA, which include avoiding, minimizing, or mitigating major impacts.
Likelihood	**Unlikely**	Low probability.
	Potential	Possible or probable.
	Likely	Certain.

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2.0 WATER AND SEDIMENT QUALITY AND USE

2.1 PROJECT OVERVIEW

Blue Marlin Offshore Port LLC (the Applicant) is proposing to develop the Blue Marlin Offshore Port (BMOP) Project (Project) in the Gulf of Mexico (GOM) to provide crude oil transportation and loading services for crude oil produced in the continental United States (U.S.). A Project overview map is provided in **Figure 2-1**. The Deepwater Port (DWP) will be utilized to load the transported crude oil onto very large crude carriers (VLCCs) (and other crude oil carriers) for export to the global market. The Applicant is filing this application for a license to construct, own, and operate the Deepwater Port (DWP) pursuant to the Deepwater Port Act (DWPA) of 1974, as amended, and in accordance with U.S. Coast Guard (USCG) and U.S. Maritime Administration (MARAD) implementing regulations.

The primary purpose of the Project will be to provide for safe and reliable long-term supply of crude oil for export to the global market. Oil for export will be transported out of the existing Sunoco Partners Marketing and Terminals, L.P., a terminal and storage facility in Jefferson County, Texas (Nederland Terminal or NT). This terminal is connected to multiple crude oil pipelines connecting to production from across the U.S. In addition, an affiliate of the Applicant owns the Stingray Pipeline System and has confirmed that its subsea pipeline and offshore platforms are suitable for converting to facilitate crude oil export from a DWP in the northern GOM. The Applicant has the exclusive right to lease or purchase the Stingray Pipeline System for use in the Project.

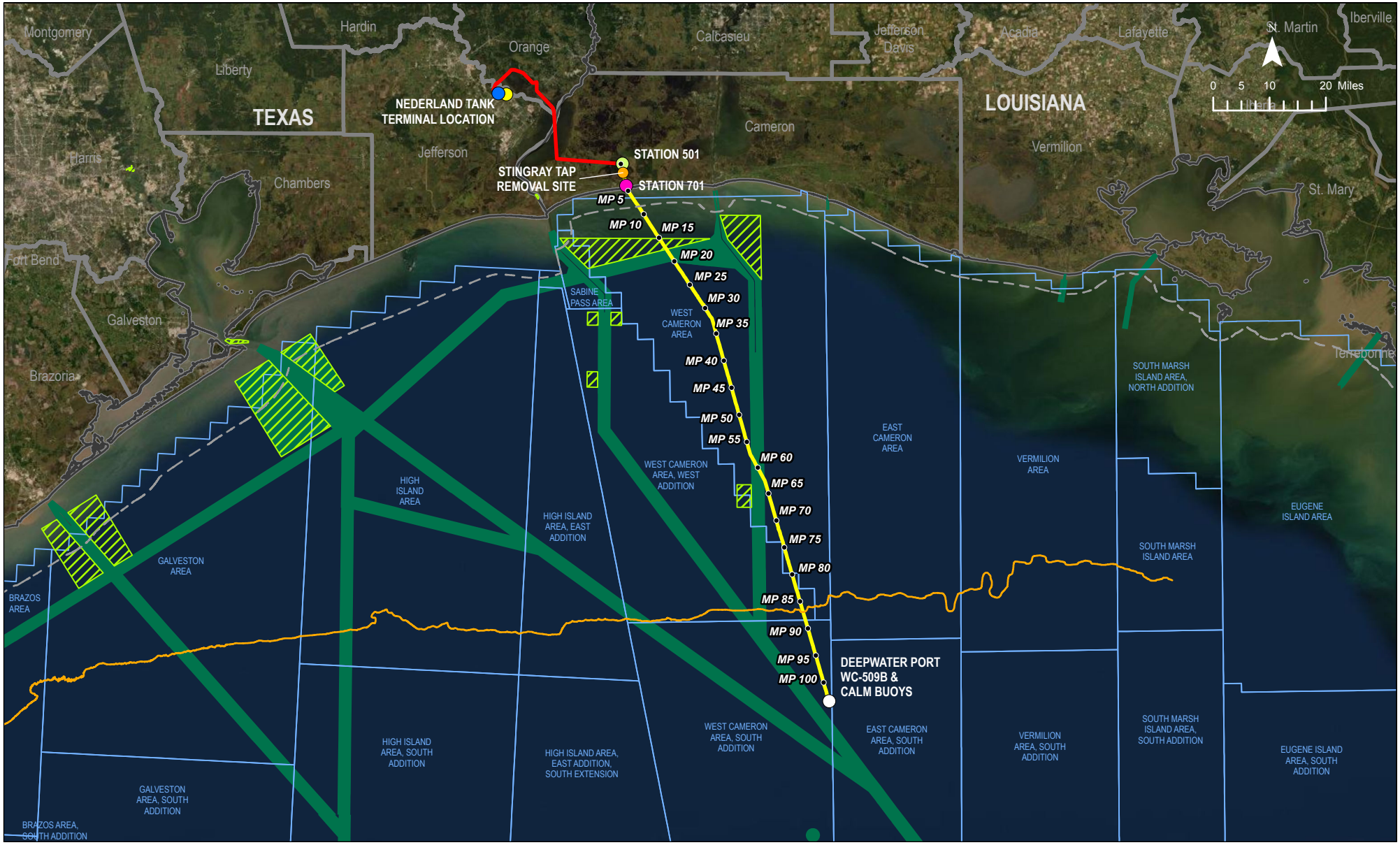
The DWP will be located in federal waters within and adjacent to the Outer Continental Shelf (OCS) in West Cameron Lease Blocks (WC) 509 and 508 and East Cameron Block 263. The DWP will be approximately 99 statute miles off the coast of Cameron Parish, Louisiana, with an approximate water depth of 162 feet. Crude oil will be routed from pumps at Nederland, through a new 42-inch outer diameter (OD) onshore pipeline to the existing Stingray Mainline at Station 501 (see Section 2.1.1), and from there through the existing Stingray Mainline to the DWP.

As depicted in **Figure 2-1**, the BMOP facilities consist of the pumps and meters at NT; a new approximate 37-mile, 42-inch OD pipeline; the existing 36-inch OD Mainline; an existing fixed, manned platform complex at WC 509; an existing platform at WC 148; two new Crude Oil Loading Pipelines; and two new PLEM and CALM Buoys located in WC 508 and EC 263. A Project overview map of the onshore Project components is provided in **Figure 2-2.** Details of the Project's offshore facilities are provided in Topic Report 1, "Project Description, Purpose, and Need" (Volume IIa). This Topic Report includes details of the onshore Project facilities.

This Topic Report describes the existing hydrology, water quality, and use of the regional aquifers underlying the Project; the potential for impacts on water resources; and the proposed measures to mitigate any identified impacts to water resources. Information in this Topic Report on the water resources potentially impacted by construction and operation of the onshore pipeline facilities is based on field surveys, publicly available data, and agency consultations. Copies of agency correspondence are provided in Volume IIa, Appendix B. Topic Report 4 "Aquatic Resources" in Volume IIb discusses the aquatic resources within the onshore Project area.

To avoid and minimize impacts to wildlife and habitats during construction and operation of the Project, the Applicant will implement construction and operation Best Management Practices (BMPs) included in the Project's Onshore Construction Best Management Practice (BMP) Plan (Appendix C-1), Revegetation Plan (Appendix C-2), Spill Prevention and Response Plan (SPAR Plan, Appendix C-3), Unanticipated Discovery Plan (Appendix C-4), and Horizontal Directional Drill (HDD) Contingency Plan (Appendix C-5) of Volume IIb.

BMOP PROJECT - FIGURE 2-1 - PROJECT OVERVIEW MAP



LEGEND

- EXISTING OFFSHORE PIPELINE MILEPOSTS
- STINGRAY TAP REMOVAL SITE
- NEDERLAND TANK TERMINAL LOCATION
- NEDERLAND PUMP STATION
- STATION 701 (TO BE CONVERTED TO OIL SERVICE)
- STATION 501 (TO BE CONVERTED TO OIL SERVICE)
- DEEPWATER PORT WC-509B AND CALM BUOYS
- EXISTING PIPELINE TO BE CONVERTED TO OIL SERVICE
- PROPOSED ONSHORE PIPELINE (NEW BUILD)
- DEPTH CONTOUR -108'
- STATE WATERS BOUNDARY
- SAFETY ANCHORAGES
- PROTRACTION AREA
- SHIPPING FAIRWAY
- COUNTY / PARISH
- STATE BOUNDARY

BLUE MARLIN OFFSHORE PORT PROJECT

PROJECT OVERVIEW MAP

COUNTY/PARISH:	VARIOUS	DRAWN BY:	CA
STATE:	TX/LA	CHECKED BY:	CW

DATE:	2020/09/17	PROJECTION:	NAD 1983 UTM Zone 15N

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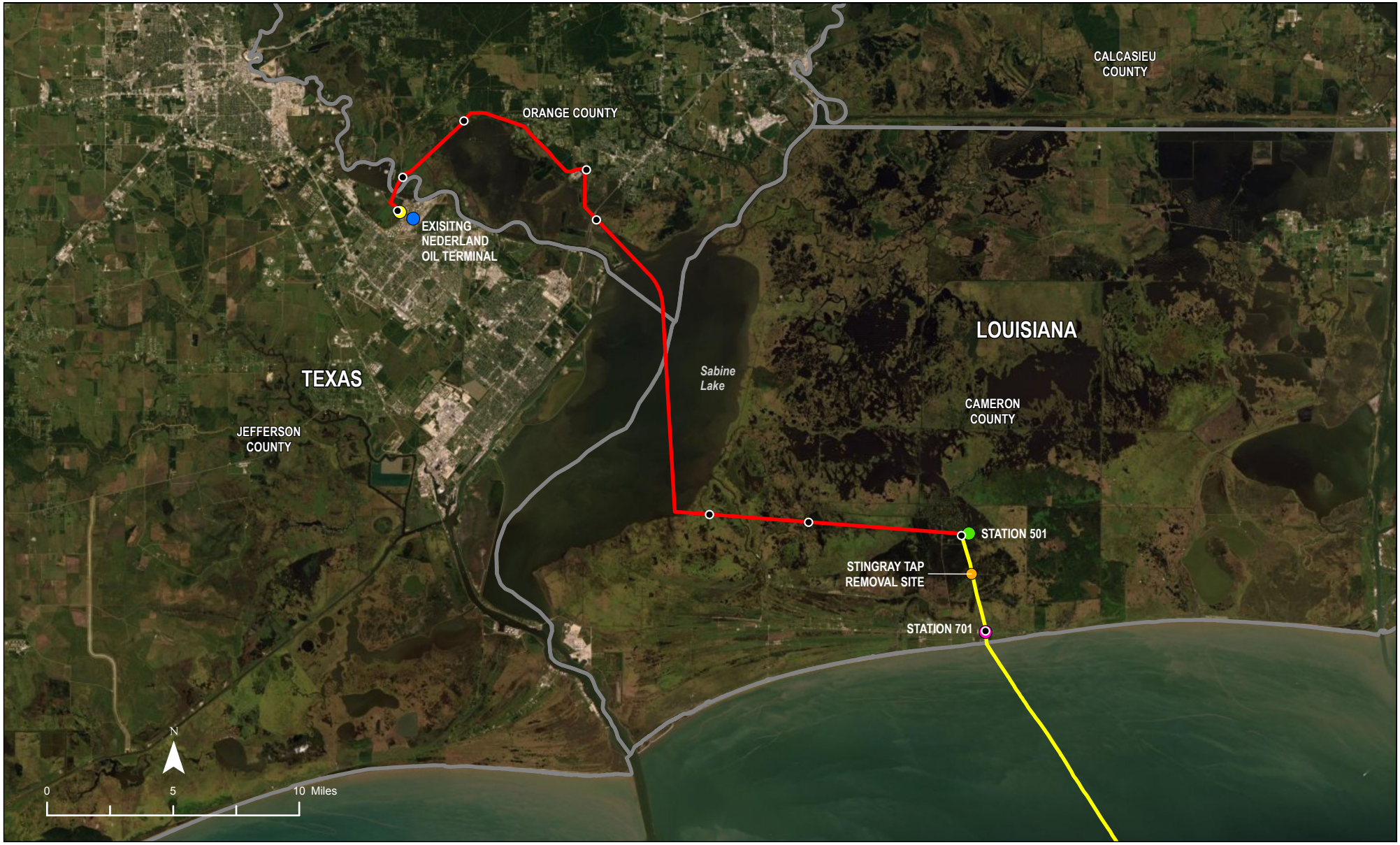
BLUE MARLIN OFFSHORE PORT PROJECT
FIGURE 2-1

DWG:	0802-01-005	SHEET:	1 OF 1

BMOP PROJECT - FIGURE 2-2 ONSHORE PROJECT COMPONENT OVERVIEW MAP



LEGEND

- MAINLINE VALVE
- NEDERLAND PUMP STATION
- STATION 501 (TO BE CONVERTED TO OIL SERVICE)
- STATION 701 (TO BE CONVERTED TO OIL SERVICE)
- EXISITNG NEDERLAND OIL TERMINAL
- STINGRAY TAP REMOVAL SITE
- EXISTING PIPELINE TO BE CONVERTED TO OIL SERVICE
- PROPOSED 42-INCH PIPELINE
- COUNTY / PARISH

BLUE MARLIN OFFSHORE PORT PROJECT
FIGURE 2-2 - ONSHORE PROJECT COMPONENT OVERVIEW MAP

COUNTY/PARISH:	VARIOUS	DRAWN BY:	CA
STATE:	TX/LA	CHECKED BY:	CW
DATE:	2020/09/17	PROJECTION:	NAD 1983 UTM Zone 15N

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BLUE MARLIN OFFSHORE PORT PROJECT
FIGURE 2-2

DWG:	0802-01-009	SHEET:	1 OF 1

2.1.1 Abandonment and Conversion of Existing Facilities

The Stingray Pipeline is currently comprised of a 36-inch pipeline (Mainline) that is fed natural gas and natural gas liquids by multiple lateral pipelines from various suppliers and producers that feed natural gas into the Mainline. Stingray transports natural gas and liquids on the Mainline from the WC 509 Platform Complex to the onshore compressor station facility (Station 701) near Holly Beach in Cameron, Louisiana, and northward approximately four additional miles to the NGPL/Stingray interconnect (Station 501). The Stingray facilities from WC 509 to Station 501 will be abandoned through a FERC 7(b) Order. This work will be completed by Stingray. Stingray will assign the existing right-of-way (ROW) Grant (and associated facilities—platforms at WC 148 and WC 509) to BMOP or another affiliate of ET for use in the BMOP Project. The Applicant intends to operate the new facilities under 49 Code of Federal Regulations (CFR) Part 195. Details of the existing offshore Stingray Mainline facilities are provided in Topic Report 1 (Volume IIa).

2.1.2 Major Onshore Project Components

All facilities for the proposed BMOP Project will be designed, constructed, tested, operated, and maintained in accordance with the U.S. Department of Transportation (USDOT) regulations in 49 CFR Part 195 (Transportation of Hazardous Liquids by Pipeline) and all other applicable federal and state regulations. Details of the offshore supply components are provided in Topic Report 1 (Volume IIa). The Project will consist of construction and operation of the following onshore components:

<u>New Onshore Facilities</u>

- A new, approximate 37-mile, 42-inch OD pipeline connecting the existing NT in Jefferson County, Texas, to the existing 36-inch OD Mainline at Station 501 in Cameron Parish, Louisiana.
- A new pump station (BMOP Pump Station) located adjacent to the existing NT in Jefferson County, Texas at MP 0.0. The land where the BMOP Pump Station site is located is to be filled as part of the "Nederland Terminal Buildout Project," which is anticipated to commence construction in January 2021, prior to construction of the BMOP Project. The pump station will include:
    - A pipeline header;
    - MLV;
    - Metering and pump equipment;
    - Electrical substation; and
    - Permanent access road.
- Six new MLVs will be installed within the permanent pipeline right-of-way (ROW) of the new build pipeline. MLVs will also be installed at the BMOP Pump Station, Station 501, and Station 701. These valves will be used for isolation and spill control purposes.

<u>Conversion of Existing Onshore Facilities</u>

- The existing Station 501 is located at approximate MP 37 of the new 42-inch pipeline in Cameron Parish, Louisiana. All existing natural gas-related equipment owned by BMOP will be removed from the Station and new pipeline facilities will be installed. The new 42-inch pipeline will tie into the existing 36-inch Mainline at the site. The conversion of Station 501 will be expanded to include:
    - A pig receiver for the new 42-inch pipeline termination;
    - Pig launcher for existing 36-inch Mainline; and
    - MLV.

- The existing compressor Station 701 in Cameron Parish, Louisiana, located at approximate MP 3.9 on the converted Stingray Mainline in Cameron Parish, Louisiana, will be demolished. All existing natural gas equipment will be removed from the Station except for several large 10,000-barrel storage tanks. Approximately 1,000 feet of new 36-inch pipe, surge tanks, surge valves, and a new MLV will be installed. The existing 10,000-barrel tanks located at Station 701 will be converted to surge relief tanks.
- The existing ANR Tap (Stingray Tap Removal Site) is located at approximate MP 1.6 on the converted Stingray Mainline in Cameron Parish, Louisiana (approximate MP 38.6 on the BMOP pipeline system). BMOP will install a 36-inch OD pipe segment following removal of the tap.
- The existing Mainline from Station 501 to the Station 701 will be converted to crude oil service.

Onshore Support Facilities

- Temporary use of existing pipe and contractor yards; and
- Use of existing public roads, highways, and canals and construction of new temporary and permanent access roads.

2.2 EXISTING ENVIRONMENT

The following sections describe the existing environment in regard to groundwater resources, surface water resources, wetlands, and floodplains that have the potential to be impacted by the onshore Project facilities. A discussion of offshore water and sediment quality and use is included in Volume IIa, Topic Report 3, "Water and Sediment Quality and Use."

2.2.1 Groundwater Resources

Groundwater is subsurface water that occupies the interstitial space between sand, clay, and rock formations. Groundwater is defined by properties such as depth to aquifer, well capacity, water quality, and geology. Groundwater is commonly withdrawn for consumption, irrigation, and industrial uses.

2.2.1.1 Aquifer System

The Project is in the Coastal Plain Physiographic Province above the Coastal Lowlands aquifer system. The Coastal Lowlands aquifer system underlies portions of southeast Texas, southern and central Louisiana, southern Mississippi, southern Alabama, and the western part of the Florida panhandle. It merges with the Mississippi River Valley alluvial aquifer at its northern boundary and extends to the edge of the continental shelf in the GOM at its southern boundary.

Water contained within the Coastal Lowlands aquifer system is generally fresh in the northern portion and brackish in the southern portion (TWDB, 2020a). The Gulfward boundary of the aquifer is near the coastline where the groundwater becomes increasingly saline (Ryder, 1996). The Coastal Lowlands aquifer system is one of the most widely used aquifers in the southeastern U.S. and is a major source of water for public consumption as well as for domestic, commercial, industrial, and agricultural uses (Renken, 1998).

The Coastal Lowlands aquifer system consists of several aquifers, including the Jasper, Evangeline, and Chicot aquifers, which are composed of discontinuous sand, silt, clay, and gravel beds. The Chicot aquifer is the principal source of groundwater in Louisiana and Texas. The Chicot aquifer system is composed of silt, sand, and gravel separated by units of clay and sandy clay. The system dips and thickens towards the south and southeast (Prakken, 2014). The base of the Chicot aquifer underlies the Project area at a depth of about 800 feet. The lower portion of the Chicot aquifer (lower 700-foot comprised of sand) is the

primary water source for the Texas portion of the Project area. In Cameron Parish, Louisiana, the base of fresh groundwater in the Chicot aquifer system generally ranges from about 300 feet below ground level in the southeastern part of the parish to about 800 feet below ground level in the north-central part; however, no fresh groundwater is present in the southwestern part of the parish where the Project area is located (Prakken, 2014).

Recharge to the aquifer system is from infiltration of precipitation, vertical leakage, and lateral groundwater flow north of the Project area where the aquifer system outcrops (Prakken, 2014). Recharge from precipitation occurs north of the Project area in areas where the system outcrops. Recharge also occurs by water movement from the Atchafalaya alluvium, downward infiltration through the clays south of the primary recharge outcrop area, upward movement from the underlying Evangeline aquifer, and inflow from the Vermilion and Calcasieu rivers. Water movement in the Project area is generally toward the pumping centers in Orange, Texas, and Lake Charles and Eunice, Louisiana. The hydraulic conductivity varies between 40 to 220 feet per day (LDEQ, 2014).

Discharge from the aquifer system is predominantly by water withdrawals from wells (Prakken, 2014). Water levels in the Chicot aquifer have declined along the Texas and Louisiana coast due to extensive pumping (Prakken, 2014; TWDB, 2006). Depth to surficial groundwater in Jefferson and Orange Counties, Texas and Cameron Parish, Louisiana ranges from about 3 to 50 feet below ground surface (bgs), with shallow groundwater near wetlands (Chowdhury and Turco, 2006; Prakken, 2014). Typical surficial water table depths in the vicinity of the Project area are highly variable and range from relatively shallow depths near surface water features and wetlands to depths approximately 35 feet bgs in upland areas along the northern part of the pipeline route (TWDB, 2020b).

Groundwater quality in the Chicot aquifer varies with depth and locality. It is generally good in the central and northeastern parts of the aquifer, where total dissolved solids concentrations are less than 500 milligrams per liter (mg/L) but is more saline to the south, where total dissolved solids are typically 1,000 to more than 10,000 mg/L and where the productivity of the aquifer decreases (George et al., 2011). Heavy pumping of the Chicot aquifer in Texas has led to saltwater encroachment in coastal portions of Jefferson County and has caused saltwater intrusion to occur in areas as far north as Orange County (Ashworth and Hopkins, 1995; TWDB, 2006). The brackish to saline quality of much of the groundwater in the Project area limits the use of such water. Groundwater wells in Jefferson County are predominantly in the northern and western portions of the county where salinity levels are lower. The groundwater in Orange County, Texas is mostly fresh to slightly saline. Underlying aquifers in Cameron Parish contain only saltwater (water with a chloride concentration of greater than 250 mg/L) (Prakken, 2014).

2.2.1.2 Sole Source Aquifers

The U.S. Environmental Protection Agency (EPA) defines a sole source aquifer (SSA), or principal source aquifer area, as one that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer, where contamination of the aquifer could create a significant hazard to public health, and where there are no alternative water sources that could reasonably be expected to replace the water supplied by the aquifer (EPA, 2017). The EPA has designated the Chicot aquifer as an SSA in southwestern Louisiana, but this designation does not apply to the Chicot aquifer in Texas (USEPA, 2008). Therefore, the Louisiana portion of the Project facilities overlie an EPA-designated SSA, but the Project facilities in Texas do not.

2.2.1.3 Groundwater Protection Areas

The Texas Commission of Environmental Quality (TCEQ), the Texas Water Development Board (TWDB), and the Texas Parks and Wildlife Department (TPWD) are authorized to identify and delineate Priority Groundwater Management Areas in Texas. The Priority Groundwater Management Area Program

is used to "…identify areas of Texas experiencing, or expected to experience, critical groundwater problems and encourage the creation of Groundwater Conservation Districts for those areas" (TCEQ, 2020a). In Texas, Groundwater Conservation Districts manage the State's groundwater resources. Groundwater Conservation Districts are locally governed districts established "…to manage groundwater by providing for the conservation, preservation, protection, recharging, and prevention of waste of the groundwater resources within their jurisdictions" (TCEQ, 2019a). Neither Jefferson nor Orange County is within a Priority Groundwater Management Area or Groundwater Conservation District. Therefore, no groundwater protection areas are in or within 150 feet of the proposed Project facilities in Texas (TCEQ, 2020a).

In Louisiana, the Louisiana Department of Environmental Quality (LDEQ) established the Louisiana Wellhead Protection Program "…to protect the quality of public drinking water supplies obtained from community water wells." In accordance with the Louisiana Wellhead Protection Program, wellhead protection areas are delineated around community wells. A wellhead protection area usually has a radius of 1,000 feet to 1 mile, depending on the depth of the well. There are no wellhead protection areas crossed by the proposed onshore pipeline facilities in Louisiana (George et al., 2011).

Additionally, the Louisiana Department of Health and Hospitals (LDHH) and the LDEQ have developed and implemented the State's Source Water Assessment Program. A component of this program is the identification and management of Source Water Protection Areas. Source Water Protection Areas identify zones through which contaminants, if present, could reach a drinking water well or surface water intake. In Louisiana, all public water systems obtain their water from either a ground water source (aquifer) or a surface water source. Delineation of source water protection areas is based on the source of the water supply. The onshore Project area in Louisiana does not overlap any source water protection areas in Louisiana (LDEQ and LDHH, 2001).

2.2.1.4 Groundwater Contamination

The potential for groundwater contamination was evaluated using EPA Enviromapper for hazardous waste and contaminated sites within 0.25 mile of the Project workspace. The EPA web site includes several EPA databases and geospatial information which are part of the following programs (EPA, 2020):

- Brownfields;
- Resource Conservation Recovery Act (RCRA) Hazardous waste;
- Superfund sites;
- Toxic releases;
- Toxic Substance Control Act (TSCA); and
- Water discharges.

No sites were identified with 0.25 mile of the Project area. No landfills are located in proximity to the Project.

2.2.1.5 Water Supply Wells and Springs

A review of TWDB Groundwater Well Viewer did not identify the presence of private or public water supply wells within 150 feet of the workspace of the onshore pipeline in Texas (TWDB, 2020b). Two industrial water supply wells were identified within 150 feet of the proposed workspace in Texas as identified in **Table 2-1**. A review of the Louisiana Department of Natural Resources (LDNR) Strategic Online Natural Resource Information System (SONRIS) did not identify the presence of any private water supply wells within 150 feet of the onshore pipeline workspace and Station 501 in Louisiana (LDNR,

2020). However, one active water supply well is located at Station 701 (LDNR, 2020). **Table 2-1** provides details for the water wells within 150 feet of the Project workspace. No springs were identified in the Project workspace.

TABLE 2-1
Private and Public Water Wells within 150 Feet of the Project Workspace

County/ Parish, State	Nearest Milepost/ Crossing Method	Well ID	Well Type / Well Use	Public or Private	Depth of Well (feet)	Distance (Direction) from Pipeline Centerline (feet)	Distance from Nearest Construction Workspace (feet)
Onshore Pipeline							
Jefferson (TX)	N/A	None	None	N/A	N/A	N/A	N/A
Orange (TX)	N/A	6257905	Industrial / Power	Private	464	N/A	14.0 (South of Staging Area)
	10.6 / Open Cut	6258708	Industrial / Utility	Private	465	211.5 (North)	111.5 (North)
Cameron (LA)	N/A	None	None	N/A	N/A	N/A	N/A
BMOP Pump Station							
Jefferson (TX)	N/A	None	None	N/A	N/A	N/A	N/A
Station 501							
Cameron (LA)	N/A	None	None	N/A	N/A	N/A	N/A
Station 701							
Cameron (LA)	N/A	023-223	Commercial Water Supply	Private (Owned by Stingray)	150	N/A - Station 701	N/A
Sources: TPWD, 2020; TWDB, 2020b; LDNR, 2020							

2.2.2 Surface Water Resources

Surface waters are defined as all natural and artificial rivers, streams, or drainages with perceptible flow at the time of crossing, as well as permanent waterbodies, such as lakes and ponds. Surface water resources are commonly used for consumption, irrigation, recreation, and industrial activities. The area of influence for considering potential impacts to surface water resources includes resources that will be within the Project footprint, as well as hydrologically connected water resources immediately upstream or downstream of the Project area.

2.2.2.1 Watersheds

The EPA defines a watershed as "an area of land where all of the water that is under it or drains off of it goes to a common waterway, such as a stream, lake, estuary, wetland, aquifer, or even the ocean." Watersheds form natural boundaries within a land mass and are geographically focused and hydrologically defined. The onshore Project area is located within the Sabine Lake watershed (Hydrologic Unit Code

[HUC] 12040201), Lower Neches watershed (HUC 12020003), and lower Calcasieu watershed (HUC 08080206) (USGS, 2019) (see **Table 2-2**).

Calcasieu and Sabine Lakes are the major waterbodies within the watersheds crossed; they receive freshwater inputs from the Calcasieu and Sabine Rivers. The wetlands within the watershed historically drained to these two lakes, but construction and maintenance of navigation channels and canals has altered the hydrology. As a result, the majority of the wetlands within the watershed have been converted from freshwater wetlands to brackish wetlands (see Section 2.2.3 for a description of wetlands).

Sabine Lake is located on the Texas/Louisiana state-line in eastern Orange County, Texas and western Cameron Parish, Louisiana and covers about 60,000 acres (24,280 hectares). Sabine Lake is about 14 miles long, 7 miles wide, and has an average depth of 6.6 feet and average salinity of 11 parts per thousand (ppt). Sabine Lake has numerous bayous flowing into it, including Cow, Dams, Black, Johnsons, Madame Johnsons, Willow, Taylor's, Hillebrant, and Big Hill Bayous. Many of the bayous are up to about 25 miles long and 100 feet wide. The western shore of Sabine Lake is developed and consists primarily of petrochemical plants/refineries. In contrast, the eastern shore is sparsely populated and forms the western boundary of the Sabine National Wildlife Refuge to the north of the Project area.

TABLE 2-2
Watersheds Crossed by the Project

Watershed/ HUC Code	Location of Watershed within Project Area (County/Parish and State)	Project Components within the Watershed	Pipeline Crossing Distance (miles)
Lower Neches/ HUC 12020003	Jefferson County, Texas and Orange County, Texas	Onshore Pipeline, MLV 1, 2, 3, and BMOP Pump Station	12.5
Sabine Lake/ HUC 12040201	Orange County, Texas and Cameron Parish, Louisiana	Onshore Pipeline and MLV 4, 5, 6	21.6
Lower Calcasieu/ HUC 08080206	Cameron Parish, Louisiana	Onshore Pipeline; Station 501; Station 701; and Stingray Tap Removal Site	3

Source: USGS, 2019

Approximately 12.5 miles of the pipeline in Texas (including mainline valves [MLVs] 1, 2, and 3) and the BMOP Pump Station are located in the Lower Neches watershed. The Lower Neches watershed encompasses an area of approximately 2,641 square miles and extends across eight counties and parishes along the state boundary between Louisiana and Texas. The primary river in the watershed is the Sabine River. The Sabine River forms the boundary between Louisiana and Texas in its lower course and forms Sabine Lake at the southern extent of the watershed. Sabine Lake is a brackish estuary that is connected to the GOM. At the northern end of the watershed, the Sabine River is dammed to create the Toledo Bend Reservoir. The Sabine River forms in northeast Texas at the confluence of the Caddo and South Forks at Lake Tawakoni. The Sabine River System drains parts of Texas and Louisiana.

Approximately 21.6 miles of the pipeline in Texas and Louisiana (including MLVs 4, 5, and 6) are located in the Sabine Lake watershed. The Sabine Lake watershed covers an area of approximately 1,040 square miles in Texas and Louisiana. From the north, two major rivers—the Sabine and Neches Rivers—discharge into Sabine Lake. South of Sabine Lake is the Sabine Pass Channel. This channel provides a narrow tidal inlet and is the outlet of the Sabine Lake, a bay-estuary system, to the GOM. This bay-estuary system has a small diurnal tidal range of 1.6 feet (NOAA, 2003). Tides interacting with freshwater river

discharges into the system produce salinity gradients in estuarine and wetland areas as well as strong salinity stratification within the ship channel (Fisher et al., 1973).

Approximately 3 miles of the pipeline in Louisiana, Station 501, Station 701, and the Stingray Tap Removal Site are located in the Lower Calcasieu watershed. The Lower Calcasieu watershed covers an area of approximately 1,080 square miles in Louisiana and drains to the Lower Calcasieu River that flows to the GOM (USGS, 2019). The Lower Calcasieu sub-basin contains the Calcasieu River, Bayou Choupique, the Intracoastal Waterway (ICWW), and many other small streams. Water movement in the lower Calcasieu River is a function of the configuration of the stream system, freshwater inflow, tidal action, and wind action (USGS, 1988).

The ICWW connects the Sabine Lake and Calcasieu Lake watersheds. The ICWW is a federally maintained channel consisting of a network of canals that establish a hydrologic connection between the Sabine and Calcasieu estuaries. In 1927, the reach of the ICWW between the Sabine River and the Calcasieu Channel was dredged to a depth of about 30 feet. The ICWW is currently maintained to navigable dimensions of about 12 feet deep and 125 feet wide (CWPPRA, 2020). The wetlands within the watershed historically drained to these two lakes, but construction and maintenance of navigation channels and canals has altered the hydrology (CWPPRA, 2020). As a result, the majority of the wetlands within the watershed have been converted from freshwater wetlands to brackish wetlands (see Section 2.2.3 for a description of wetlands).

2.2.2.2 Waterbodies Crossed by the Project

The Applicant conducted field surveys of waterbodies within the entire Project area during March, May and June of 2020. The surveys were conducted in accordance with Chapter 62-340 of the FAC, Delineation of the Landward Extent of Wetland and Surface Water; the 1987 Corps of Engineers Wetland Delineation Manual; and the 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0). Prior to the surveys, a desktop review was conducted of the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) database to determine potential waterbody locations. During the surveys, an approximate 300-foot survey corridor centered along the proposed pipeline (150 feet from each side of the centerline) was evaluated in May and June of 2020. In addition, the entire footprint of the proposed workspace for the existing and proposed stations, and access roads which require improvement was surveyed. The wetland and waterbody field survey report are provided in **Volume IIb, Appendix D-1.** The mapped location of all delineated waterbodies within the onshore pipeline survey area is included in the field survey report and on aerial alignment sheets included in **Volume IIb, Appendix A-2**. Waterbodies crossed by the onshore pipeline are listed in **Attachment 2.A** of this report.

In Sabine Lake, where the pipeline will be installed primarily by trenching from barges, a 1,000-foot-wide corridor centered along the proposed pipeline (500 feet from each side of the centerline) was surveyed in May and June of 2020. A discussion of the State waters benthic habitat is included in Volume IIb, Topic Report 4.

During the biological field surveys, waterbodies in the Project area were classified by the following NWI Classifications:

- Estuarine, Subtidal, Unconsolidated Bottom (E1UB) – Unvegetated tidal habitats with continuously submerged substrate (unvegetated);
- Palustrine, Unconsolidated Bottom (PUB) – Unvegetated natural drainage feature or pond;
- Palustrine, Unconsolidated Bottom, Excavated (PUBx) – Unvegetated excavated drainage feature; and

- Riverine, Lower Perennial Unconsolidated Bottom (R2UB) – Unvegetated natural drainage feature.

2.2.2.3 Navigable Waterbodies

The Rivers and Harbor Act (RHA) pertains to activities impacting navigable waters, including harbor and river improvements. Section 10 of the RHA prohibits the unauthorized obstruction or alteration of any navigable water. Section 14 of the RHA, also referred to as Section 408, grants permission for the alteration, occupation, or use of a USACE civil works project if the activity will not be injurious to the public interest or affect the USACE project's ability to meet its authorized purpose. Construction of any structure or the accomplishment of any other work affecting course, location, condition, or physical capacity of waters of the U.S. must be authorized by the USACE. In the Project area, the Neches River, Intercoastal Waterway (within Sabine Lake), and Sabine Lake are regulated under Section 10. Additionally, the Neches River and the Intercoastal Waterway located within Sabine Lake (crossed using the HDD method) are regulated under Section 14 (Section 408) of the RHA.

In the Project area, the USACE Galveston and New Orleans District offices have the authority to review and issue permits for projects that involve discharge of dredge or fill material into Waters of the U.S. and work within or crossing any waters regulated under Section 10 and Section 14 of the RHA. Copies of the permit applications are provided in Volume I, Appendix C-1.

2.2.2.4 State Water Quality Classification

States are mandated to adopt and review water quality standards under Section 303(c) of the Clean Water Act (CWA). Water quality standards define the beneficial designated uses that are protected for each waterbody, and the associated water quality criteria that must be met to protect those uses. Water quality classifications are based on the designated uses set under the State-specific water quality standards.

Consideration of water quality classifications for waterbodies potentially affected by a project may be used to assess whether potential project impacts are consistent with and protective of designated uses and ensure that a project will not exacerbate existing water quality impairments.

Texas

In Texas, surface water quality standards are administered by the TCEQ for waters of the state as described in Title 30, Chapter 307 of The Texas Administrative Code (TAC), also known as the Texas Surface Water Quality Standards. The TCEQ classifies waterbodies into four categories of designated surface water use and the conditions that must be met for each category of use to be fully supported, partially supported, or not supported. These designated use categories are:

- Aquatic life – Vegetative and physical components of the aquatic environment will be maintained or mitigated to protect aquatic life uses.
    - Characterizations of aquatic life which indicates that a subcategory of aquatic life use includes limited, intermediate, high, or exceptional.
    - Oyster waters – Waters producing edible species of clams, oysters, or mussels.
- Contact recreation – Recreational activities involving a significant risk of ingestion of water, including wading by children, swimming, water skiing, diving, and surfing.
- Public drinking water supply – A water body designated to provide water to a public water system as defined in Chapter 290 of this title (relating to Public Drinking Water).

- Fish consumption – TCEQ assesses the fish consumption use by reviewing Texas Department of State Health Services (TDSHS) human risk assessment information, consumption advisories, and aquatic life closures.

Classified surface waterbodies are evaluated by a statewide water quality assessment program on the numerical or narrative limits for their biological, chemical, and physical properties. These conditions are monitored in segments of state designated waterbodies in order to identify whether the designated use is fully supported, partially supported, or not supported (TCEQ, 2012). Classified segments may include streams, rivers, bays, estuaries, wetlands, lakes, or reservoirs. However, not all surface waters of the State of Texas are designated segments for classification and/or monitoring; thus, certain waters do not have water quality designations and are not monitored by the TCEQ. TCEQ water quality classifications for the waterbodies crossed by the Project are included in **Table 2-3.**

Impaired Surface Waters

A waterbody that does not achieve water quality criteria for one or more of its designated uses is considered impaired and listed as an impaired waterbody under Section 303(d) of CWA. The TCEQ assesses the condition and status of the state's surface water quality every two years and is responsible for enforcing and maintaining state water quality standards within these waterbodies (TCEQ, 2020b). The segments and subsegments are then assigned to one of five categories. Impaired waters fall under either Category 4 or 5, and each of these categories is further divided into three subcategories (a, b, or c) as follows:

- Category 1 – attaining the water quality standard and no use is threatened;
- Category 2 – attaining some of the designated uses, no use is threatened, and insufficient or no data and information are available to determine if remaining uses are attained or threatened;
- Category 3 – insufficient or no data and information to determine if any designated use is attained;
- Category 4 – standard is not supported or is threatened for one or more designated uses but does not require the development of a total maximum daily load (TMDL);
    - Category 4a – TMDL has been completed and approved by the EPA;
    - Category 4b – other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future;
    - Category 4c – nonsupport of the water quality standard is not caused by a pollutant;
- Category 5 – Category 5 is the 303(d) list; the waterbody does not meet applicable water quality standards or is threatened for one or more designated uses by one or more pollutants;
    - Category 5a – TMDL is underway, scheduled, or will be scheduled;
    - Category 5b – review of the water quality standards will be conducted before a TMDL is scheduled; and
    - Category 5c – additional data and information will be collected before a TMDL is scheduled (TCEQ, 2018).

The TCEQ aggregates segments of waterbodies by basin. Basins are classified as either river basins, coastal basins, bay basins, or GOM basins.

As shown in **Table 2-3**, two TCEQ-designated Category 5 (impaired) surface waters will be crossed by the onshore pipeline (TCEQ, 2020c,d). High concentrations of bacteria, which are found in both human and animal waste, have been observed in the tidal portion of the Neches River (Segment 0601). The Neches River will be crossed utilizing the HDD method which will avoid impacts to this waterbody. The Texas portion of Sabine Lake was not classified as impaired for oyster propagation. However, the estuary was

classified as impaired for fish consumption. Since both waterbodies are classified as Category 5a, a TMDL has not been developed for these impairments.

TABLE 2-3
TCEQ Impaired Surface Water Segments Crossed by Onshore Pipeline

Waterbody Crossed	Segment Type	Segment Name/ ID	Basin Name	Designated Uses	Impaired Use	Impairment Category/ Reason
Neches River	Tidal Stream	Neches River Tidal/ 0601	Neches River Basin	PCR, AL (I), CR	Contact Recreation	5a/Bacteria
					Aquatic Life	5c/PCB
	Estuary	Sabine Lake/ 2412	Bays and Estuaries	PCR, AL (H/O)	Fish Consumption	5a/PCB in edible tissue

Source : TCEQ, 2020c, d

Notes :

PCR = Primary Contact Recreation, AL = Aquatic Life, H = High Aquatic Life Use; I = Intermediate Aquatic Life; O = Oyster Waters, CR = Contact Recreation

Category 5a = TMDLs are underway, scheduled, or will be scheduled for one or more parameters.

Category 5c = Additional data or information will be collected and/or evaluated for one or more parameters before a management strategy is selected.

PCB = polychlorinated biphenyls

Aboveground facilities are not located in waterbodies.

Louisiana

In Louisiana, surface water quality standards are administered by the LDEQ for the waters of the state as described in Title 33, Part IX, Chapter 11 of the Louisiana Administrative Code (LAC). Water quality standards are developed to enhance or maintain water quality and to provide for, and fully protect, the designated uses of the waters of the state. Waters of the state include all surface and underground waters and watercourses within the confines of the state, and all surface waters extending 3.0 miles from the coastline into the GOM. The designated uses of Louisiana waters include one or more of the following:

- Primary Contact Recreation – Any recreational or other water contact activity involving prolonged or regular full-body contact with the water and in which the probability of ingesting appreciable amounts of water is considerable;
- Secondary Contact Recreation – Any recreational or other water contact activity in which prolonged or regular full-body contact with the water is either incidental or accidental, and the probability of ingesting appreciable amounts of water is minimal;
- Fish and Wildlife Propagation – The use of water for aquatic habitat, food, resting, reproduction, cover and/or travel corridors for any indigenous wildlife and aquatic life species associated with the aquatic environment. The subcategory of limited aquatic life and wildlife use may be designated if habitat quality and species diversity is low;
- Oyster Propagation – The use of water to maintain biological systems that support economically important species of oysters, clams, mussels or other mollusks so that their productivity is preserved and the health of human consumers of these species is protected;
- Agriculture – Use of water for crop spraying, irrigation, livestock watering, poultry operations, and other farm purposes not related to human consumption;
- Drinking Water Supply – Use of water for human consumption and general household use; and

- Outstanding Natural Resource Waters – Waterbodies designated for preservation, protection, reclamation, or enhancement of wilderness, aesthetic qualities, and ecological regimes, such as those designated under the Louisiana Natural and Scenic Rivers System or those designated by the LDEQ as waters of ecological significance.

These designated uses apply to all tributaries of any waterbody or segment that is listed specifically under Louisiana water quality standards, except for the classifications of Drinking Water Supply, Outstanding Natural Resource Waters, and Oyster Propagation, which are only applicable to the listed segment. LDEQ water quality classifications for the waterbodies crossed by the Project are included in **Table 2-4**. Sabine Lake fully supports primary contact recreation, secondary contact recreation, and fish and wildlife propagation (LDEQ, 2018).

Impaired Surface Waters

A waterbody that does not achieve water quality criteria for one or more of its designated uses is considered impaired and listed as an impaired waterbody under Section 303(d) of CWA. In Louisiana, LDEQ manages water quality standards to comply with and the Louisiana Water Control Law (Title 30, Chapter 4 of Louisiana's revised statutes). The LDEQ assesses the condition and status of the state's surface water quality and is responsible for enforcing and maintaining state water quality standards within these waterbodies.

The LDEQ classifies major surface waters into subsegments to manage and protect the chemical, physical, biological, and aesthetic integrity of the water resources and aquatic environment of Louisiana. LDEQ publishes the Integrated Report, a biannual report that documents the State's compliance with Sections 303(d) and 305(b) of the CWA (LDEQ, 2018). In Louisiana, the onshore pipeline crosses one subsegment that is categorized as impaired. This segment is part of Sabine Lake and are LDEQ Integrated Report Category (IRC) 5. **Table 2-4** details LDEQ-designated impaired waters crossed by the onshore pipeline. High concentrations of fecal coliform, due to natural sources and waterfowl, have been observed in the Sabine Lake (Segment LA110303_00) resulting in an impairment for oyster production. A TMDL has not been developed for impairments in Sabine Lake (LDEQ, 2020).

TABLE 2-4
LDEQ Impaired Surface Water Segments Crossed by Onshore Pipeline

Waterbody Crossed	Segment Type	Subsegment Name/ ID	Basin Name	Impaired Use	Impairment Category/Reason
Sabine Lake	Estuary	Sabine Lake/ LA110303_00	Sabine River Basin	Oyster Propagation	IRC 5/ Fecal coliform due to waterfowl and natural sources

Source: LDEQ, 2018
Integrated Report Category (IRC 5) = 303(d) List
Aboveground facilities are not located in waterbodies.

2.2.2.1 Sensitive Surface Waters

The National Wild and Scenic Rivers System was created to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. The National Park Service (NPS) is responsible for the full range of responsibilities to protect and enhance rivers under the National Wild and Scenic Rivers Act and maintains a listing of more than 3,200 free-flowing Nationwide River Inventory (NRI) segments in the U.S. that are believed to possess one or more "outstandingly remarkable" natural or cultural values judged to be at least regionally significant that are potential candidates for inclusion in the National Wild and Scenic River System (NPS,

2020). None of the waterbodies crossed by the Project are designated as National Wild and Scenic Rivers or NRI segments.

In Texas, the TPWD has designated the Lower Neches River as an ecologically significant waterbody from the confluence with Sabine Lake in Orange County upstream to Town Bluff Dam in Jasper and Tyler Counties (Norris and El-Hage, 2005). The Neches River is considered ecologically significant due to riparian conservation areas such as the Big Thicket National Preserve, Lower Neches River Wildlife Management Area, and being part of the Great Texas Coastal Birding Trail. It features high water quality, exceptional aquatic life, and high aesthetic value. This segment of the Neches River contains known listed species and unique communities consisting of the paddlefish, sandbank pocketbook freshwater mussels, and heelsplitter freshwater mussels. The Applicant will cross the Neches River by utilizing the HDD method. Use of the HDD method will avoid direct waterbody impacts between the drill entry and exit points. Therefore, it is not anticipated that construction activities will have an adverse effect on these waterbody resources.

In Louisiana, the Louisiana Department of Wildlife and Fisheries (LDWF) administers the Louisiana Scenic Rivers Program for the purpose of preserving, protecting, reclaiming, and enhancing the wilderness qualities, scenic beauties, and ecological regimes of designated Louisiana streams (LDWF, 2020). No waterbodies located in the Project area in Louisiana have been identified as state-designated natural and scenic rivers or outstanding natural resource waters (NPS, 2020; LDWF, 2020).

2.2.2.2 Potable Water Intakes

The TCEQ and LDEQ identify protection zones for areas surrounding sole-source surface drinking water supplies, including 3 miles upstream from the water supply intake. The Project does not cross any designated sole-source drinking water supply stream segments and is not within 3 miles of any identified stream segments in Texas (TCEQ, 2018) or Louisiana (Louisiana Geographic Information Center, 2015). Public water supplies in the Project area are obtained primarily from the Chicot aquifer (see the Groundwater discussion).

2.2.2.3 Sediment Quality

A description of the sediments in Sabine Lake is included in Section 4.2.1.1 of Topic Report 4 (Volume IIb). The Project will not cross any surface waterbodies containing contaminated sediments. A study by the National Oceanic and Atmospheric Administration (NOAA) that assessed sediment toxicity and chemical contamination in Sabine Lake determined that toxicity of the sediments in the Project area was not significantly different from controls (Long, 1999). The report concluded that sediment quality in the Project area within Sabine Lake was not severely degraded (Long, 1999). The Applicant has prepared an Unanticipated Discovery Plan to address procedures in the event unanticipated discoveries of contaminated media are made during construction of the proposed Project (**Volume IIb, Appendix C-4**).

2.2.3 Wetlands

The USACE defines wetlands as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Environmental Laboratory, 1987). Wetlands can be a source of substantial biodiversity and serve a variety of functions that include providing wildlife habitat, recreational opportunities, flood control, and naturally improving water quality.

2.2.3.1 Existing Wetlands in the Project Area

The Applicant conducted wetland delineations within the entire Project area during May and June of 2020, in accordance with Chapter 62-340 of the FAC, Delineation of the Landward Extent of Wetland and Surface Water; the 1987 Corps of Engineers Wetland Delineation Manual; and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plan Region (Version 2.0) (November 2010). Prior to the surveys, a desktop review was conducted of the USFWS NWI database to determine potential wetland locations. During the surveys, an approximate 300-foot survey corridor centered along the proposed pipeline (150 feet from each side of the pipeline). In addition, the entire footprint of the proposed workspace for the existing and proposed stations and access roads was surveyed. The Wetland and Waterbody Delineation Report is provided in **Appendix D-1** (**Volume IIb**), which includes the mapped location of all delineated wetlands within the onshore Project survey area. and on aerial alignment sheets included in **Appendix A-2** (**Volume IIb**). Wetlands crossed by in the Project are listed in **Attachment 2.B** of this report.

The USFWS wetland classification system described by Cowardin et al. (1979) was used to classify the wetlands that will be affected by the Project. The wetland and aquatic habitats identified within the onshore Project area are comprised of two major systems (estuarine and palustrine) in the Cowardin classification system (Cowardin et al., 1979). Estuarine habitats are semi-enclosed but have at least sporadic access to open water and are at least occasionally diluted to brackish salinities by freshwater inflow. Palustrine habitats include non-tidal wetlands as well as tidal wetlands with salinities below 0.5 ppt that are situated shoreward of lakes, rivers, or estuaries (Cowardin et al., 1979). Refer to **Appendix D-1** (**Volume IIb**) for the Onshore Pipeline Wetland and Waterbody Delineation Report.

The wetland types associated with the proposed Project facilities include:

- Estuarine intertidal emergent (E2EM),
- Palustrine emergent (PEM),
- Palustrine scrub shrub (PSS), and
- Palustrine forested (PFO) wetlands.

Estuarine communities occur in tidal areas in which salinity due to ocean-derived salts is equal to or greater than 0.5 percent; E2EM communities are dominated by erect, rooted, herbaceous hydrophytes. Ponded estuarine areas (EIUB) are interspersed within these wetlands and have hydric soils and hydrology but lack any vegetative growth. Palustrine communities occur in tidal and non-tidal areas in which salinity due to ocean-derived salts is below 0.5 percent; PEM wetlands are dominated by persistent emergent vascular plants, while PSS wetlands are dominated by woody vegetation less than 16 feet in height. PFO wetlands are dominated by woody species greater than 16 feet in height. In the Project area, estuarine communities dominate in areas subject to tidal influence, and palustrine communities occur in areas protected from the influx of oceanic water. A detailed description of each wetland type and its dominant species is provided in **Table 2-5**. Details of the proposed Project-related impacts are discussed in Section 2.3.3**.**

TABLE 2-5
Wetland Vegetation Species Common in the Project Area

Wetland Type	Facility	Dominant Vegetation
E2EM	Onshore Pipeline MLV 5 Station 501 Station 701 Stingray Tap Removal Site	Smooth cordgrass (*Spartina alterniflora*) Common reed (*Phragmites australis*) Saltmeadow cordgrass (*Spartina patens*) Sturdy bulrush (*Bolboschoenus robustus*)

TABLE 2-5
Wetland Vegetation Species Common in the Project Area

Wetland Type	Facility	Dominant Vegetation
PEM	Onshore Pipeline, Staging Areas, MLV 1, MLV 2, MLV 4, TAR-05-A	Alligator weed (*Alternanthera philoxeroides*) Green flatsedge (*Cyperus virens*) Gulf Coast spikerush (*Eleocharis cellulose*) Sand spikerush (*Eleocharis montevidensis*) Longtom (*Paspalum denticulatum*) Southern cattail (*Typha domingensis*) Giant cutgrass (*Zizaniopsis miliacea*)
PEMx	Onshore Pipeline	Broadleaf cattail (*Typha latifolia*) Sand spikerush (*Eleocharis montevidensis*)
PSS	Onshore Pipeline	Chinese tallow (*Triadica sebifera*) Broadleaf arrowhead (*Sagittaria latifolia*)
PFO	Onshore Pipeline	Black willow (*Salix nigra*) Chinese tallow (*Triadica sebifera*) Sweet gum (*Liquidambar styraciflua*) Slender woodoats (*Chasmanthium laxum*) Sand spikerush (*Eleocharis montevidensis*) Alligator weed (*Alternanthera philoxeroides*)

2.2.4 Floodplains

Executive Order 11988, Floodplain Management, requires each Federal agency to ensure that the potential effects of any action it may take in a floodplain be evaluated. According to Federal Emergency Management Agency (FEMA) National Flood Insurance Rate Maps, the majority of the onshore pipeline and all MLVs are located within the 100-year flood zone. Approximately 3.8 miles of the northern portion of the pipeline route in Orange County, Texas is located within areas within or outside of the 500-year flood zone, as detailed in **Table 2-6**. The BMOP Pump Station, Station 501, Station 701, and the Stingray Tap Removal site are located within the 100-year flood zone (FEMA, 2020a). After construction, the pipeline right-of-way (ROW) and additional temporary workspace (ATWS) areas will be returned to original grade. The aboveground facilities (i.e., BMOP Pump Station, Station 501 and Station 701 will be built in accordance to local county or parish codes and regulations and the potential flood risk for each station.

TABLE 2-6
Flood Hazard Zones Crossed by the Project

Project Component/ County or Parish	Miles of Pipeline in the 100-Year Flood Zone	Miles of Pipeline in the 500-Year Flood Zone	Miles of Pipeline Outside of the 500-Year Flood Zone
Onshore Pipeline			
Jefferson, TX	1.0	0.0	0.0
Orange, TX	14.7	1.5	2.3
Cameron, LA	14.5	0.0	0.0
Aboveground Facilities			
MLV 1, 2, 4, 5, 6	Yes	No	No
MLV 3	No	Yes	No
BMOP Pump Station	Yes	No	No
Station 501	Yes	No	No
Station 701	Yes	No	No

TABLE 2-6
Flood Hazard Zones Crossed by the Project

Project Component/ County or Parish	Miles of Pipeline in the 100-Year Flood Zone	Miles of Pipeline in the 500-Year Flood Zone	Miles of Pipeline Outside of the 500-Year Flood Zone
Stingray Tap Removal	Yes	No	No
Total	**30.2**	**1.5**	**2.3**

Sources: FEMA, 2020a,b; Property Shark, 2020

2.3 ENVIRONMENTAL CONSEQUENCES

This section includes a discussion of the impacts that will likely result from the construction and operation of the onshore components of the Project. The study area within which potential impacts were assessed includes the area that will be affected physically by Project activities during construction and operation. As described in **Table 1.10** in Section 1.10.2 (Evaluation Criteria) of Topic Report 1 (Volume IIb), the Project's effects on water and sediment quality and use have been evaluated based on their potential to:

- Violate a Federal, state, local, or Federally recognized international water quality criterion or waste discharge requirement;
- Cause irreparable harm to human health, aquatic life, or beneficial uses of aquatic ecosystems;
- Degrade groundwater quantity or quality;
- Degrade marine, coastal, or terrestrial (lakes, rivers, wetlands, tidal environments) water quality;
- Alter sediment composition, structure, or function; and/or
- Increase contaminant levels in the water column, sediment, or biota to levels shown to have the potential to harm organisms, even if the levels do not exceed the formal water quality criteria.

Activities associated with the construction, operation, and decommissioning of the onshore pipeline components that are likely to have environmental consequences on water and sediment quality and use are included in **Table 2-7**. The following sections provide further information and discussion of potential environmental consequences.

TABLE 2-7
Potential Impacts on Water and Sediment Quality and Use

Activity		Details	Duration of Impact	Mitigation Measures	Anticipated Level of Impact
Construction					
Installation of Onshore Pipeline	Open Cut/ Push Pull	• Impacts to groundwater resources (i.e., depth, quality, and quantity of groundwater) due to trench excavation, dewatering, soil compaction preventing aquifer recharge, inadvertent spills) • Impacts to surface water resources (i.e., bank destabilization, aquatic habitat modification, releases of chemical and nutrient pollutants from sediments, increased turbidity, erosion, decreased dissolved oxygen concentrations, inadvertent spills) • Impacts to wetland resources (i.e., erosion, soil compaction, wetland conversion (PFO to PSS and PEM), wetland functional reduction, inadvertent spills	Short-term to Long-term	• Collocation of pipeline ROW • Onshore Construction BMPs • Revegetation Plan • SPAR Plan • Compliance with USACE and State Permit Conditions	Negligible to moderate

TABLE 2-7
Potential Impacts on Water and Sediment Quality and Use

Activity		Details	Duration of Impact	Mitigation Measures	Anticipated Level of Impact
	Sabine Lake	• Bank destabilization • Aquatic habitat modification • Releases of chemical and nutrient pollutants from sediments • Increased turbidity and sedimentation • Decreased dissolved oxygen concentrations • Inadvertent spill resulting in decreased water quality	Short-term	• Onshore Construction BMPs • SPAR Plan • HDD Contingency Plan • Compliance with USACE and State Permit conditions	Negligible to moderate
	HDD	• Accidental fluid release/incidental return resulting in decreased water quality (through increase in turbidity) • Inadvertent spills and potential contamination • Habitat modification	Short-term	• HDD Contingency Plan • Onshore Construction BMPs • SPAR Plan • Compliance with USACE and State Permit conditions	Negligible
Installation of Aboveground Facilities		• Soil erosion and surface water runoff • Soil compaction • Inadvertent spills • Conversion of vegetation cover to impervious surface	Short-term to Long-term	• Use of existing disturbed footprint for conversion of existing facilities (i.e., Mainline, Station 501, and Station 701) • Onshore Construction BMPs • Revegetation Plan • SPAR Plan • Compliance with USACE and State Permit Conditions	Negligible to minor
Hydrostatic Testing		• Transport sediments into wetlands or waterbodies • Inadvertent spills • Increased turbidity and scour affecting water quality and habitat	Short-term	• Onshore Pipeline Construction BMPs • Compliance with National Pollutant Discharge Elimination System (NPDES) Discharge Permit Conditions	Negligible to minor and localized
Operations					

TABLE 2-7
Potential Impacts on Water and Sediment Quality and Use

Activity	Details	Duration of Impact	Mitigation Measures	Anticipated Level of Impact
Onshore Pipeline and Aboveground Facility Operations	• Temporary disruption due to maintenance activities • Periodic maintenance could involve ground-disturbing activities or result in a release of hazardous material	Lifetime of Project	• Onshore Construction BMPs during maintenance activities • SPAR Plan • Compliance with Applicant's Coastal Louisiana Pipeline Facility Response Plan (PHMSA Sequence No. 3202), modified to include BMOP • Compliance with MARAD license conditions	Negligible to minor and localized
Upsets and Accidents				
Onshore Pipeline and Aboveground Facility Operations	• Water quality impairments due to: o Accidental spills o Surface water runoff at aboveground facilities o Wetland functional reduction	Short-term to Long-term	• Compliance with Applicant's Coastal Louisiana Pipeline Facility Response Plan (PHMSA Sequence No. 3202), modified to include BMOP • Continuous monitoring of pipeline operations, SCADA, early detection of abnormal operations, and remote shutdown	Minor to major and localized, depending on the volume of oil released and the exposure of species to the release
Decommissioning				
Onshore Pipeline Decommissioning (Abandonment in Place)	• Onshore pipeline will be abandoned in-place and maintenance of the ROW will stop	Short-term	• Onshore Construction BMPs • SPAR Plan • Comply with MARAD license conditions	Negligible and localized
Aboveground Facility Decommissioning	• All Station components and impervious surfaces will be removed and the impacts involved with removal of the facility would be similar to those described for construction • Restoration to pre-construction conditions	Short-term	• Onshore Construction BMPs • SPAR Plan • Comply with MARAD license conditions	Beneficial to negligible and localized

2.3.1 Groundwater Resources

This section includes a discussion of the impacts that will likely result from construction, operation, and decommissioning of the onshore components of the Project as well as BMPs that the Applicant will employ to minimize impacts on groundwater resources.

2.3.1.1 Construction and Installation

Onshore Pipeline

Potential effects to the depth, quality, and quantity of groundwater include reductions in groundwater levels, increased turbidity due to water withdrawals and discharges during construction, and reduced water quality. Surficial aquifers and aquifer recharge areas could sustain indirect effects from changes in overland sheet flow due to clearing and grading of the workspace. Heavy construction equipment, including equipment used for clearing and grading the ROW, could cause compaction and could reduce the ability of soils to absorb water in some areas, thus affecting the ability and/or speed in which water enters the aquifer. Groundwater may also be affected by physical changes to subsurface geology that will affect wells in the area.

Project construction will not substantially affect groundwater resources because the majority of construction will include shallow, temporary excavation for the pipeline trench. Construction of the onshore pipeline will take place mostly where the surface water table is within the trench or grading depth. Typical groundwater depths in the vicinity of the Project are highly variable and range from relatively shallow depths near surface water features and wetlands and to depths greater than approximately 5 feet bgs. Following construction, the Applicant will restore the ground surface contours as closely as possible to pre-construction conditions and will revegetate the ROW to ensure restoration of pre-construction overland flow and recharge patterns in accordance with the Applicant's Onshore Construction BMP Plan. Additionally, in agricultural, residential, and wetland areas, the Applicant will de-compact subsoil via plow or other deep tillage methods before replacing topsoil which will allow water to percolate through the soils.

The majority of construction in the Project area will utilize the push/pull construction method due to saturated soil conditions in the Project area. Excavation could increase turbidity within the groundwater resources adjacent to construction activities; however, there will not be a significant or adverse impact on groundwater quantity or quality as potential turbidity will be localized to the disturbance area.

In upland areas where the open cut conventional crossing method is proposed, trench dewatering may be necessary where the water table is near the ground surface during construction of the pipeline. Trench dewatering operations will be brief, typically lasting several days or less, and water levels will quickly return to normal after cessation of pumping. To minimize withdrawal and discharge impacts on the shallow aquifer during trench dewatering, the Applicant will discharge all water from dewatering activities directly into properly constructed dewatering structures or filter bags/hay bale structures, which will allow the sediments to settle before water infiltrates back into the subsurface. Water table elevations will return to pre-construction levels soon after the trench has been backfilled. As a result, potential impacts on groundwater associated with trench dewatering will be short-term, minor, adverse and will not be significant.

The onshore pipeline will cross the Chicot aquifer, which is designated as an SSA in Louisiana. Due to saltwater intrusion in this area, the aquifer is unsuitable for domestic purposes. Given the impermeability of the clay layer and the depth of the Chicot aquifer, construction of the onshore pipeline will not adversely affect the Chicot aquifer, its groundwater quality, or the SSA in Louisiana. Localized, near-surface soil compaction caused by heavy construction vehicles could reduce water infiltration and increase runoff and

potential ponding. In areas of cleared vegetation, water infiltration will be reduced until vegetation has been restored, which could have a temporary effect on deep aquifer recharge. To minimize impacts on groundwater during construction of the onshore pipeline and to restore pre-construction overland flow and recharge patterns, the Applicant will adhere to the measures in its project-specific Construction BMP Plan. This includes installation of trench breakers to prevent groundwater movement or loss from nearby wetlands, restoration of topographic contours to pre-construction conditions, and restoration of vegetation to the ROW. Further, the Applicant will use HDD to install the pipeline at nine locations along the onshore pipeline route. Use of the HDD method will avoid direct surface impacts between the drill entry and exit points. However, a temporary, localized increase in groundwater turbidity could occur in the event of an inadvertent release of drilling fluid (also termed an "inadvertent return") into the groundwater. Drilling fluid is composed of water and bentonite clay (a naturally occurring mineral). The EPA does not list bentonite as a hazardous substance, and no long-term adverse environmental impacts are expected should an inadvertent return occur. Similarly, while native soils may mix with the drilling fluid because of the drilling process, no adverse environmental impacts from these materials are expected should an inadvertent return occur.

Contamination caused by spills of hazardous materials during construction could infiltrate the ground and reach unconfined aquifers and shallow groundwater areas. The greatest risk to groundwater resources due to accidental spills during construction will be associated with refueling or storage of fuel, oil, or other fluids. If not adequately cleaned up, contaminated soil could continue to leach and add pollutants to groundwater long after a spill occurred. By restricting the location of refueling and storage areas, and by cleaning up any inadvertent releases, the potential effects associated with spills or leaks of hazardous liquids will be avoided or minimized. The Applicant will adhere to its project-specific SPAR Plan, which includes spill prevention and containment measures to prevent and minimize potential impacts on groundwater resources.

Two industrial water supply wells were identified within 150 feet of the proposed onshore pipeline in Orange County, Texas and one industrial water supply well is located within Station 701 (owned by Stingray). There is no known groundwater withdrawal or drinking wells within 150 feet of the onshore Pipeline route. In the unlikely event that construction of the Project temporarily impacts private well quality, the Applicant will provide alternative water sources or other compensation to the well owner(s). In the event that it is determined that permanent impacts have occurred as a result of construction activities, the Applicant will repair, replace, or provide alternative sources of water. Should a well be drilled within 150 feet of the Project workspace before construction commences, the owners will be offered pre- and post-construction water quality well testing conducted by a qualified independent inspection service. Because of the absence of bedrock near the surface, blasting will not be necessary for this Project and, therefore, will not affect wells in the area. No known contaminated sites exist near the Project.

Water for hydrostatic testing will be obtained from surface water sources. Since groundwater withdrawals are not anticipated, potential resultant changes in flow patterns and/or lowering of the local groundwater table as a result of such withdrawals will not occur.

Overall, substantial impacts on the groundwater resources underlying the pipeline facilities are not anticipated due to: the absence of active public and private drinking water supply wells within 150 feet of the pipeline construction work areas; BMP measures that will be implemented by the Applicant; and post-construction contour restoration and revegetation to ensure the restoration of overland flow and recharge patterns. Further, the Project is underlain by multiple strata of dense clay content, which provide a restrictive layer to slow or prevent the downward migration of surface and near-surface waters or contaminants, thereby providing a natural protective barrier to groundwater quality. With the implementation of the measures described above, potential impacts on groundwater from construction of the onshore pipeline would be indirect, adverse, short-term, and minor.

Aboveground Facilities

Mainline Valves

MLVs will be installed in locations along the pipeline system that are accessible to authorized employees and that are protected from damage and tampering in accordance with USDOT standards described in 49 CFR Part 195. The MLVs will also be installed in locations along the pipeline system that will minimize damage or pollution from accidental hazardous liquid discharges in accordance USDOT standards. MLV sites are small, each approximately 0.1 acre in size, with aboveground piping and valves enclosed within a fenced gravel or platform area. No new impervious surfaces will be required for the MLVs. Potential groundwater impacts due to construction will be similar to the pipeline. Since groundwater withdrawals are not anticipated, potential resultant changes in flow patterns and/or lowering of the local groundwater table as a result of such withdrawals will not occur. There is a potential for inadvertent spills to occur during construction, but with proper adherence to the SPAR Plan and Onshore Construction BMP Plan, impacts to groundwater resources would be indirect, highly localized, short-term, and negligible.

BMOP Pump Station

The BMOP Pump Station site is proposed to be developed as part of the Nederland Terminal Buildout Project, which is anticipated to commence in January 2021, prior to construction of the BMOP Project. Therefore, no new impervious surfaces will be required by construction of the BMOP Pump Station which could potentially affect groundwater resources by reducing infiltration and groundwater recharge. Since groundwater withdrawals are not anticipated, potential resultant changes in flow patterns and/or lowering of the local groundwater table as a result of such withdrawals will not occur. There is a potential for inadvertent spills to occur during construction, but with proper adherence to the SPAR Plan and Onshore Construction BMP Plan, impacts to groundwater resources would be indirect, highly localized, short-term, and negligible.

Station 501

Station 501 is an existing facility that will be converted and expanded to accommodate new equipment. All existing natural gas-related equipment will be removed from the Station and new oil pipeline facilities will be installed. Construction and installation of Station 501 will involve ground-disturbing activities resulting in soil compaction that could temporarily reduce surface soil infiltration. Permanent fill of wetland in the area required for expansion will also reduce infiltration capacity, which could reduce the rate of uptake by the underlying Gulf Coast aquifer. However, the amount of acreage converted to gravel surface is minor relative to the surrounding undeveloped land and the largest recharge area for the Chicot aquifer is located north of the Project area. Since groundwater withdrawals are not anticipated, potential resultant changes in flow patterns and/or lowering of the local groundwater table as a result of such withdrawals will not occur. There is a potential for inadvertent spills to occur during construction, but with proper adherence to the SPAR Plan and Onshore Construction BMP Plan, impacts to groundwater resources would be indirect, highly localized, short-term, and negligible.

Station 701

Station 701 is an existing fenced and graveled facility that will be converted for the Project. Existing natural gas equipment will be removed from the station and new equipment and pipe will be installed within the existing facility boundaries. ATWS areas will be required during construction and will be returned, as closely as possible, to pre-construction contours and allowed to naturally revegetate. In areas requiring ground disturbance, potential groundwater impacts due to construction will be similar to the pipeline. There is a potential for inadvertent spills to occur during construction, but with proper adherence to the SPAR Plan and Onshore Construction BMP Plan, impacts to groundwater resources would be direct, highly localized, short-term, and negligible.

Stingray Tap Removal Site

The Applicant will install a pre-tested pipeline segment following removal of the tap by TC Energy. ATWS within and adjacent to the existing Mainline permanent ROW will be required during construction and will be returned, as closely as possible, to pre-construction contours and allowed to naturally revegetate. In areas requiring ground disturbance, potential groundwater impacts due to construction will be similar to the pipeline. There is a potential for inadvertent spills to occur during construction, but with proper adherence to the SPAR Plan and Onshore Construction BMP Plan, impacts to groundwater resources would be direct, highly localized, short-term, and negligible.

Pipe and Contractor Yards/Staging Areas

The Applicant anticipates using existing laydown yards during onshore construction. Use of these yards is not anticipated to result in impacts on groundwater resources, as they will continue to be used for their current purpose.

The Applicant is proposing to use staging areas during onshore construction. Potential groundwater impacts associated with staging areas will be similar to pipeline construction.

Access Roads and Canals

The Applicant intends to utilize existing public roads, highways, and canals to access the sites during construction. Limited improvements (i.e., grading and gravel refresh) are planned for some existing private roads to support Project construction; however, widening of access roads is not anticipated to be required. One new temporary access road (TAR-05-A) will be required to access the construction ROW in Orange County, Texas. This temporary access road will be returned to pre-construction conditions following construction.

Four new permanent access roads (PARs) will be required to extend existing roads to MLV sites (i.e., PAR-03, PAR-05, PAR-13, and PAR-15). Permanent gravel and fill will be required for expansion of the new PARs which could reduce infiltration capacity and recharge of the underlying aquifer system. However, the amount of acreage converted to gravel surface is minor relative to the surrounding undeveloped land and the largest recharge area for the Chicot aquifer is located north of the Project area. The potential for inadvertent spills will be minimized by proper adherence to the SPAR Plan. Therefore, potential groundwater impacts due to construction of new permanent and temporary access roads and use of existing access roads during construction are anticipated to be direct, highly localized, short-term, and negligible.

Existing canals to be used for construction equipment are necessary for HDD equipment, mats, and other materials necessary for pipeline construction to be brought to the work site. The access canals will not require improvements (i.e., dredging) for channel deepening or widening. Although the likelihood of a fuel spill or release of hazardous materials would be extremely remote, the vessel captain will implement spill prevention procedures and clean-up measures outlined in the Applicant's SPAR Plan. Therefore, no groundwater impacts from the use of existing canals are anticipated during construction.

2.3.1.2 Operations

Onshore Pipeline

Planned and unplanned maintenance will occur during the life of the Project. It is unlikely that routine operation and maintenance of the onshore pipeline will impact groundwater resources. Routine operation of the onshore pipeline will not require the use of groundwater resources. Periodic maintenance could

involve ground-disturbing activities or result in an inadvertent release of hazardous material. Impacts are generally similar to those described for construction. To minimize the impacts associated with an accidental release of oil or other hazardous materials during operations (i.e., maintenance), the Applicant will implement its Coastal Louisiana Pipeline Facility Response Plan which includes BMPs to avoid and minimize the potential for accidental releases and contains measures that will be implemented to clean up any releases. With proper adherence to the Applicant's Coastal Louisiana Pipeline Facility Response Plan, potential impacts to groundwater resources during pipeline operation and maintenance would be direct, highly localized, short-term, and negligible.

Aboveground Facilities

Routine operation of the aboveground facilities will not require the use of groundwater resources. Therefore, it is unlikely that routine operation will impact groundwater resources. There is a potential for inadvertent spills to occur during routine maintenance. To minimize impacts to groundwater resources from spills and stormwater runoff, the Applicant will adhere to the Coastal Louisiana Pipeline Facility Response Plan and Onshore Construction BMP Plan. These plans include measures to minimize contaminants in stormwater runoff and avoid inadvertent spills. With proper adherence to the Coastal Louisiana Pipeline Facility Response Plan and Onshore Construction BMP Plan, potential impacts to groundwater resources during aboveground facility operations would be direct, highly localized, short-term, and negligible.

Access Roads and Canals

The Applicant intends to utilize existing public roads, highways, and canals to access the sites during operations. The increase in vehicles and vessel traffic in the access roads canals in the Project area during operation will be similar to construction and is anticipated to be long-term, intermittent, and negligible.

2.3.1.3 Upsets and Accidents

Onshore Pipeline

During operations, an unanticipated release of petroleum products, such as fuel, could lead to contamination and negatively impact groundwater resources. All leaks and spills potentially resulting in contamination will be contained and remedied on site as soon as practicable, and in compliance with the Applicant's Coastal Louisiana Pipeline Facility Response Plan (PHMSA Sequence No. 3202), modified to include BMOP. Volume IIa, Appendix H details the potential for an oil spill from the DWP or pipeline and the potential impacts that could result from the Project.

To minimize the potential occurrence of a large spill, the pipeline will be constructed with MLVs (i.e., shut-off valves) to allow sections of the pipeline to be isolated. The volume of oil that could be released due to a leak would be limited to the amount of oil that leaked prior to detection and the volume remaining in the isolatable section. Overall, the risk of a pipeline crude oil release is low due to safety mechanisms built into the pipeline system which will prevent a continuous release of oil. The Applicant will comply with their existing Coastal Louisiana Pipeline Facility Response Plan (PHMSA Sequence No. 3202), modified to include BMOP. With implementation of the safety design features for onshore facilities and the mitigation measures, potential impacts on groundwater resources due to an oil spill are anticipated to be direct and adverse, and depending on the size of the spill, could be short-term or long-term and minor to major.

Aboveground Facilities

Impacts to groundwater resources due to upsets and accidents at the aboveground facilities will be similar to those described for the onshore pipeline. The 15,000-barrel storage tanks at Station 701 located within a secondary containment berm designed per National Fire Protection Act (NFPA) requirements and will be capable of containing 110 percent of the capacity of one storage tank. All leaks and spills potentially resulting in contamination will be contained and remedied on site as soon as practicable, and in compliance with the Applicant's Coastal Louisiana Pipeline Facility Response Plan (PHMSA Sequence No. 3202), modified to include BMOP. With implementation of the safety design features for onshore facilities and the mitigation measures, potential impacts on groundwater resources due to an oil spill are anticipated to be direct and adverse, and depending on the size of the spill, could be short-term or long-term and negligible to major.

2.3.1.4 Decommissioning

The onshore pipeline is expected to have a lifespan of 25 years. At the time of decommissioning, the Applicant will seek to abandon the pipeline in place and restore the aboveground facilities and the MLV sites to pre-construction condition.

Onshore Pipeline

At the time of decommissioning, the Applicant will seek to clean and abandon the pipeline in place, which will not result in any new negative impacts to the groundwater resources. There is a potential for inadvertent spills to occur due to machinery use during decommissioning, but with proper adherence to the SPAR Plan and Onshore Construction BMP Plan, potential impacts to groundwater resources would be short-term and negligible.

Aboveground Facilities

At the time of decommissioning, the Applicant will seek to remove the industrial facilities within the fence line, including all impervious surfaces. The conversion of impervious surfaces back to pervious surfaces will increase infiltration capacity, which will increase the rate of uptake into the underlying Gulf Coast aquifer, thus resulting in positive, direct impacts to groundwater resources within the operational workspace of the aboveground facilities. There is a potential for inadvertent spills to occur due to machinery use during decommissioning, but with proper adherence to the SPAR Plan and Onshore Construction BMP Plan, potential impacts to groundwater resources will be short-term and negligible.

2.3.2 Surface Water Resources

This section includes a discussion of the potential impacts to surface water resources that will likely result from construction, operation, upsets and accidents, and decommissioning of the onshore components of the Project as well as measures that the Applicant will employ to minimize potential impacts on surface water resources. Topic Report 4 (Volume IIb) discusses the aquatic resources within the onshore Project area and the fish and invertebrates inhabiting them.

2.3.2.1 Construction and Installation

Direct impacts on surface water resources are defined as those Project-related impacts that occur to waterbodies in the construction workspace that are temporarily or permanently disturbed and for which the acreage of impacts is quantifiable. Direct impacts may include increased sedimentation and turbidity associated with construction activities and alterations to the depth of the waterbody (e.g., filling or dredging). Indirect impacts on surface water resources will occur outside of the construction workspace

and may include potential changes in flow regime or water quality and sedimentation. There is also potential for inadvertent leaks and spills to occur from construction equipment during installation of the onshore pipeline. To minimize potential impacts to surface water resources from spills, the Applicant will implement and comply with the SPAR Plan which includes measures to minimize and avoid inadvertent spills.

Onshore Pipeline

The surface waters that will be impacted during construction and operation of the onshore pipeline are listed in **Attachment 2.A** of this report. The Applicant will use the HDD method (to cross the Neches River, canal to Neches River, ICWW, and the northern Sabine Lake shoreline approach), the lay barge method (to cross parts of Sabine Lake), and the open cut and push/pull methods to cross the remaining waterbodies along the pipeline route. Potential impacts on these surface waters during construction of the Project are described in the following sections.

Open Cut Crossing

Pipeline construction, particularly open cut crossings, can increase turbidity and introduce sediment into waterbodies. Open cut waterbody crossings will be performed in accordance with the Project-specific Onshore Construction BMP Plan to minimize potential construction impacts to waterbodies. These measures include minimization of clearing of streamside vegetation and installation and maintenance of temporary and permanent erosion controls. The amount of equipment simultaneously utilized at any one waterbody crossing, as well as the time period needed to perform the required work will be kept to a minimum, to mitigate potential impacts. During pipeline construction activities at waterbody crossings, disruption to waterbody flow will be limited and care taken to limit the increase in the suspended sediment concentrations of the waterbody. More particularly, adequate flow rates will be maintained in waterbodies to limit the potential impacts to aquatic life. All waterbody bank reclamation will be in accordance with engineering drawings, erosion and sedimentation control requirements, and permit requirements.

Following installation and backfilling of the pipeline, suspended sediments, and turbidity will decline to pre-construction levels fairly rapidly. Waterbody banks will be stabilized as soon as possible after construction activities have been completed to prevent sloughing, in accordance with the Onshore Construction BMP Plan. Stream banks will be seeded and covered with erosion control fabric or jute mesh as soon as stabilization of the stream banks is accomplished. Following construction, all waterbody crossings will be inspected to ensure erosion control devices are functioning properly and that revegetation is progressing satisfactorily. With the implementation of the Onshore Construction BMP Plan and SPAR Plan, potential impacts on waterbodies crossed using the open-cut construction method will be direct, adverse, short-term, and moderate.

Push/Pull Technique

The majority of construction in the Project area will utilize the push/pull construction method due to saturated conditions in the Project area. Several waterbodies will be crossed in these saturated areas. The push/pull technique (see Volume IIb, Topic Report 1, Section 1.5.3.2) is used in large wetland areas where sufficient water is present for floating the pipeline in the trench, and grade elevation over the length of the push/pull area will not require damming to maintain adequate water levels for flotation of the pipe. This method involves pushing the prefabricated pipe from the edge of the wetland or pulling the pipe with a winch from the opposite bank of the wetland into the trench.

Similar to the open cut method described above, excavation could increase turbidity within the waterbodies crossed; however, there will not be a significant or adverse impact as potential turbidity will be localized

to the disturbance area. With the implementation of the Onshore Construction BMP Plan, potential impacts on waterbodies crossed using the push/pull technique will be direct, adverse, short-term, and moderate.

HDD Crossing

The HDD construction method (see Volume IIb, Topic Report 1, Section 1.5.3.2) involves the circulation of drilling mud to remove cuttings, stabilize the borehole, and cool and lubricate the drill bit. Drilling mud is composed primarily of freshwater, bentonite clay, and a small number of other additives. The use of the HDD method will eliminate or significantly reduce the potential for construction-related impacts on water quality because it avoids disturbance of stream beds and banks and associated riparian vegetation. However, there is the potential during drilling for an inadvertent release of drilling mud through sand or gravel, or through fractured rock formations. Because drilling mud is composed of primarily freshwater and bentonite, a small release will likely dissipate, and impacts on water quality beyond a temporary increase in turbidity will not be anticipated. In larger quantities, the release of drilling mud could negatively affect fisheries and/or vegetation, although impacts will generally be less than those associated with an open-cut crossing. To minimize potential impacts on water quality in the event of an inadvertent release of drilling mud, the Applicant has prepared an HDD Contingency Plan that describes the methods that will be used avoid or minimize the risk of drilling mud release, as well as the mitigative procedures that will be followed if an inadvertent release does occur. The Applicant will monitor the drill trajectory during HDD operations to quickly identify and contain any inadvertent releases of drilling fluid. In the event of an inadvertent release of drilling fluid during HDD operations, the Applicant will adhere to the response measures in the HDD Contingency Plan.

Site-specific drawings showing the proposed HDD crossings are included in **Volume IIb, Appendix B3** showing the location of mud pits, pipe assembly areas, and areas to be disturbed, and identification of aboveground disturbances or clearing between the HDD entry and exit workspaces. As discussed in Topic Report 7, "Soils and Geologic Resources", the Applicant has included supporting geotechnical survey information for the HDD crossings to show that the proposed HDD crossings are anticipated to be successful based on the existing geologic and soil conditions. Volume III, Appendix C [*Confidential*] includes the HDD Geotechnical Reports.

In the event the HDD crossing is unsuccessful, the Applicant will attempt to retrieve any equipment/pipe strings, adjust the trajectory as required, and repeat the HDD at the same location or shift the HDD location slightly (within the existing certificated workspace and permanent ROW) and re-drill until the crossing is successfully installed. If modifications that exceed the approved workspace and/or permanent ROW are required, the Applicant will obtain all necessary permits and authorizations prior to initiation of additional drilling. With implementation of the HDD Contingency Plan, Onshore Construction BMP Plan, and SPAR Plan, potential impacts on waterbodies crossed using the HDD method will be direct, adverse, short-term, and negligible.

Sabine Lake Crossing

Approximately 12 miles of the onshore pipeline will be installed in Sabine Lake using a combination of the HDD method, open-cut construction from lay barges, and the push/pull technique. A discussion of construction methods is included in Volume IIb, Topic Report 1. As shown in **Table 2-3**, an HDD will be used to install the pipeline across the northern shoreline approach of Sabine Lake, the Intracoastal waterway, and a foreign pipeline in Sabine Lake. Open-cut construction using lay barges across the lake bottom will connect the two HDD segments. The southern shore crossing of Sabine Lake will be crossed using the push/pull technique.

The greatest potential for drilling mud to be released into the lake will be at the HDD entry and exit points. Temporary siltation and sedimentation could occur at the HDD entry and exit points in Sabine Lake,

primarily from the drilling mud associated with the initial drilling of the pilot hole, the subsequent reaming, and the pulling of the pipeline through the hole. Drilling mud is non-toxic and will not chemically affect organisms in the lake; however, sessile organisms near the release could be smothered and killed.

Open-cut construction using a lay barge will be used for the remainder of the Sabine Lake crossing. As described in Volume IIb, Topic Report 1, the Applicant proposes to use a 300-foot-wide construction ROW to allow for dredging of both the pipeline trench and the floatation channels that will be required for operation of the lay barges. Pipeline construction across Sabine Lake will require the dredging and excavation to allow a 4-foot minimum depth from lake bottom to top of pipe. Sediments excavated to install the pipeline will be temporarily stored in the lake adjacent to the pipeline ditches. After the pipeline installation is complete, the pipe trench will be backfilled and the lake bottom contours returned to pre-construction conditions to the maximum extent practicable.

The primary potential impacts on water quality associated with open-cut construction in the lake will be the resuspension of sediment into the water column. Dredging and excavation operations necessary to install the pipeline through Sabine Lake may suspend sediment and affect water quality and aquatic resources. Sediments may be resuspended during trench excavation and from spoil pile erosion due to wind and wave forces. These lake processes could result in additional impacts on water quality and aquatic resources. The suspended solids and turbidity levels will decline to ambient levels following completion of construction. Turbidity resulting from trenching could reduce light penetration and the corresponding primary production of aquatic plants, algae, and phytoplankton. Additionally, the potential resuspension of organic materials and sediments could cause an increase in biological and chemical oxygen demand along the construction ROW. Lower dissolved oxygen concentrations could cause a temporary displacement of motile organisms and may stress or kill sessile or sedentary benthic organisms within the construction ROW.

The suspended or colloidal particles, commonly referred to as total suspended solids (TSS), are all the extremely small suspended solids in water which will not settle out by gravity. Excavation, spoil placement, and burial with the excavator will result in increased TSS loads in Sabine Lake waters. Use of clamshells has been found to produce average TSS concentrations of 200 mg/L (Herbich and Brahme, 1991), which is below levels known to have adverse effects on cetaceans or fish (typically 1,000 mg/L; NOAA, 2020). Davies (2005) conducted modeling of suspended sediment plumes from pipeline trenching in Sabine Lake and predicted critical plumes (>25 mg/L) on the order of 1,640 feet wide and 1,640 to 3,280 feet long depending on current hydrologic conditions, but noted ambient TSS levels of 40 mg/L.

As part of the Port Arthur LNG Project, Sempra conducted a turbidity analysis for a pipeline crossing in Sabine Lake. As described in the Federal Energy Regulatory Commission's Environmental Impact Statement (EIS) for the Port Arthur LNG Project (2006) and based on Sempra's turbidity analysis from 2005, the proposed dredging activities in all but the lowest reaches of Sabine Lake may have the potential to generate turbidity levels above background concentrations. However, the ambient turbidity levels in the water (as generated by flows, waves, and ship traffic in the ICWW) create a high background level of turbidity, thereby reducing the potential relative impact of dredging-related turbidity. Therefore, it is anticipated that only localized and short-term increased turbidity events are anticipated during construction. Further, the 2006 EIS also stated that, based on correspondence from the TPWD, Sabine Lake is chronically turbid, and aquatic species mortality due to excess turbidity has not been documented.

In order to minimize the suspension of sediments as a result of temporarily stockpiling spoil adjacent to the floatation channel or trench, the Applicant will attempt to leave the top of spoil piles below the water surface. Temporarily storing the spoil below the water surface will minimize the potential for erosion due to wind and wave forces. Following pipeline installation, the trench will be backfilled with native material to within +/- 1 foot of ambient bottom conditions.

With the implementation of the Onshore Construction BMP Plan, SPAR Plan, HDD Contingency Plan, and compliance with the USACE permit conditions, it is anticipated that potential construction impacts to Sabine Lake will be direct, adverse, short-term, and negligible (i.e., HDD method) to moderate (i.e., lay barge open cut method).

Hydrostatic Testing

As discussed in Topic Report 1, the pipeline will be hydrostatically tested to ensure the system is capable of withstanding the operating pressure for which it was designed in accordance with PHMSA requirements (49 CFR Part 195). Estimated water use requirements, water update source, and discharge locations for hydrostatic testing the onshore pipeline are provided in **Table 1-6** of Volume IIb, Topic Report 1. The Applicant estimates that 16,215,868 gallons of hydrostatic test water will be required for testing the pipelines and aboveground facilities. Water will be obtained from the Neches River, Sabine Lake, or a commercial open water supply source.

Following satisfactory completion of hydrostatic testing, the test water will typically be discharged into the original source (see Volume IIb, Topic Report 1, **Table 1-6**). If discharging directly to receiving waters, the Applicant will use diffusers (energy diverters) to minimize the potential for stream scour. All testing activities will be conducted within the parameter of the applicable water withdrawal and discharge permits. The Applicant will not add any chemicals to the hydrostatic test water, and the discharged water will be tested in accordance with permitting requirements. In addition, the Applicant will implement the measures outlined in its Onshore Construction BMP Plan, which include screening intakes to avoid entrainment of fish; maintaining adequate stream flow rates to protect aquatic life and to provide for all waterbody uses and downstream withdrawals of water by existing users; siting hydrostatic test manifolds outside of wetlands and riparian areas to the maximum extent practicable; regulating discharge rates; using energy dissipation devices; and installing sediment barriers as necessary to prevent erosion, streambed scour, suspension of sediments, or excessive streamflow. With the implementation of these measures, potential impacts on water quality due to hydrostatic testing will be short-term, localized, and negligible to minor.

Aboveground Facilities

Mainline Valves

Results of the wetland and waterbody delineation surveys determined that MLV 5 is partially located in E1UB waterbody and MLV 6 is entirely located in an E1UB classified waterbody. MLVs are required to be installed in locations along the pipeline system that are accessible to authorized employees and that are protected from damage and tampering in accordance with USDOT standards described in 49 CFR Part 195. The MLVs will also be installed in locations along the pipeline system that will minimize damage or pollution from accidental hazardous liquid discharges in accordance USDOT standards. Due to extensive wet areas within the Project area, avoidance for placement of these MLVs in EIUB was not practicable while complying with other regulatory and engineering requirements in. Due to the wet conditions in the Project area in Cameron Parish, the Applicant will install MLV 5 and MLV 6 on platforms within the operational ROW which will minimize impacts to E1UB waterbodies.

Temporary waterbody impacts in ATWS will be similar to the pipeline. The Applicant will minimize the unavoidable waterbody impacts in construction workspace areas by implementing the measures outlined in the Applicant's Onshore Construction BMP Plan. The potential for inadvertent spills will be minimized by proper adherence to the SPAR Plan. Additionally, the Applicant will comply with conditions specified in its pending CWA Section 404 permit. Therefore, potential impacts to E1UB waterbodies will be direct, highly localized, short-term, and minor.

BMOP Pump Station

The BMOP Pump Station site is proposed to be developed as part of the Nederland Terminal Buildout Project, which is anticipated to commence in January 2021, prior to construction of the BMOP Project. Therefore, the site will consist of developed land and will not result in waterbody impacts.

Station 501

Station 501 is an existing facility that will be converted and expanded to accommodate new equipment for the Project. All existing natural gas-related equipment will be removed from the Station and new oil pipeline facilities will be installed. The existing facility footprint will be expanded and ATWS will be required in waterbody (E1UB) areas during construction. Due to extensive wet areas surrounding the existing facility, avoidance of E1UB for the expansion and placement of the ATWS is not possible. However, expansion of the permanent facility footprint has been placed within a previously disturbed area that is surrounded by an existing berm. Locating the ATWS in this area will minimize impacts.

Temporary waterbody impacts to E1UB in ATWS will be similar to the pipeline. The Applicant will minimize the unavoidable waterbody impacts in ATWS areas by implementing the measures outlined in the Applicant's Onshore Construction BMP Plan. The potential for inadvertent spills will be minimized by proper adherence to the SPAR Plan. Additionally, the Applicant has prepared a USACE Section 10/404 permit application (provided in Volume I, Appendix C-1) to mitigate temporary and permanent waterbody impacts at this site and will comply with conditions specified in its pending CWA Section 404 permit. Therefore, impacts to waterbodies will be direct, highly localized, long-term, and minor at Station 501.

Station 701

Station 701 is an existing facility that will be converted for the Project. ATWS areas along the existing Mainline north and south of the facility boundary will be required during construction and will be returned, as closely as possible, to pre-construction contours and allowed to naturally revegetate. Construction at this site will not result in waterbody impacts.

Stingray Tap Removal Site

The Applicant will install a pre-tested pipeline segment following removal of the tap by TC Energy. ATWS within and adjacent to the existing Mainline permanent ROW will be required during construction and will be returned, as closely as possible, to pre-construction contours and allowed to naturally revegetate.

Due to extensive wet areas surrounding the existing facility, waterbody (E1UB) avoidance for placement of the ATWS is not possible. Temporary impacts to E1UB waterbodies in ATWS will be similar to the pipeline. The Applicant will minimize the unavoidable waterbody impacts in ATWS areas by implementing the measures outlined in the Applicant's Onshore Construction BMP. The potential for inadvertent spills will be minimized by proper adherence to the SPAR Plan. Additionally, the Applicant has prepared a USACE 10/404 permit application (Volume I, Appendix C-1) and will comply with conditions specified in its pending CWA Section 404 permit. Therefore, impacts to waterbodies will be direct, highly localized, short-term, and minor at the Stingray Tap Removal Site.

Pipe and Contractor Yards/Staging Areas

The Applicant anticipates using existing laydown yards during onshore construction. Use of these yards will not result in impacts on surface water resources, as they will continue to be used for their current purpose.

The Applicant is proposing to use staging areas during onshore construction. Use of these staging areas will not result in impacts on surface waterbodies and potential impacts will be similar to pipeline construction.

Access Roads and Canals

The Applicant intends to utilize existing public roads, highways, and canals to access the sites during construction. Limited improvements (i.e., grading and gravel refresh) are planned for some existing private roads to support Project construction; however, widening of access roads is not anticipated to be required. One new temporary access road (TAR-05-A) and four new PARs will be required to extend existing roads to MLV sites (i.e., PAR-03, PAR-05, PAR-13, and PAR-15). The temporary and permanent access roads do not impact waterbodies. The potential for inadvertent spills will be minimized by proper adherence to the SPAR Plan. Therefore, no waterbody impacts from the use of existing access roads and construction of new access roads are anticipated during construction.

Existing canals to be used for construction equipment are necessary for HDD equipment, mats, and other materials necessary for pipeline construction to be brought to the work site. The access canals will not require improvements (i.e., dredging) for channel deepening or widening. Furthermore, Sabine Lake, the Neches River, and the ICWW were specifically created to provide deepwater access for maritime commerce, and as such, the use of waterways by vessels to accommodate pipeline construction is consistent with the planned purpose and use of these active shipping channels. During construction, barges will only remain when necessary or to facilitate delivery of construction materials.

Boat movements and the movements of support vessels and other supply vessels are not expected to substantially increase shoreline erosion, benthic sediment disturbance, or prop scarring in the immediate area, primarily because the vessels are slow moving and would not create substantial wakes which will also minimize the potential for aquatic wildlife to be harmed by vessel strikes during construction. In addition, although the likelihood of a fuel spill or release of hazardous materials would be extremely remote, the vessel captain will implement spill prevention procedures and clean-up measures outlined in the Applicant's SPAR Plan. Overall, the increase in vessel traffic within the access canals during construction will be short-term and potential impacts on waterbodies is anticipated to be negligible.

2.3.2.2 Operations

Onshore Pipeline

Potential impacts associated with planned and unplanned maintenance may occur during the life of the Project. Impacts to surface waters are not expected during operation of the onshore pipeline because no further in-stream activities would be expected. Because the pipeline will be installed at a sufficient depth below the beds of waterbodies (HDD segments will be installed much deeper), exposure of the pipe is not anticipated.

Periodic maintenance could involve ground-disturbing activities or result in an inadvertent release of hazardous material. Potential impacts are generally similar to those described for construction, but typically the same or shorter in duration. To minimize potential impacts associated with an accidental release of oil or other hazardous materials during operations (i.e., maintenance), the Applicant will implement its Coastal Louisiana Pipeline Facility Response Plan which includes BMPs to avoid and minimize the potential for accidental releases and contains measures that will be implemented to contain and clean up any releases. With proper adherence to the Coastal Louisiana Pipeline Facility Response Plan, potential impacts to surface water resources during pipeline operation and maintenance will be direct, highly localized, short-term, and negligible.

Aboveground Facilities

Operation of the aboveground facilities is not anticipated to result in impacts to waterbodies. There is a potential for inadvertent spills to occur during routine operation and maintenance. To minimize potential impacts to surface water resources from spills and stormwater runoff, the Applicant will adhere to the Coastal Louisiana Pipeline Facility Response Plan and Onshore Construction BMP Plan. These plans include measures to minimize contaminants in stormwater runoff and avoid inadvertent spills. With proper adherence to the Coastal Louisiana Pipeline Facility Response Plan and Onshore Construction BMP Plan, potential impacts to surface water resources during aboveground facility operations will be direct, highly localized, short-term, and negligible.

Access Roads and Canals

The Applicant intends to utilize existing public roads, highways, and canals to access the sites during operations. The increase in vehicles and vessel traffic in the access roads canals in the Project area during operation will be similar to construction and is anticipated to be long-term, intermittent and negligible.

2.3.2.3 Upsets and Accidents

Onshore Pipeline

During operations, an unanticipated release of petroleum products, such as fuel, could lead to contamination and negatively impact surface water resources. All leaks and spills potentially resulting in contamination will be contained and remedied on site as soon as practicable, and in compliance with the Applicant's Coastal Louisiana Pipeline Facility Response Plan (PHMSA Sequence No. 3202), modified to include BMOP. Volume IIa, Appendix H details the potential for an oil spill from the DWP or pipeline and the potential impacts that could result from the Project.

To minimize the potential occurrence of a large spill, the pipeline will be constructed with six MLVs (i.e., shut-off valves) over the 37-mile distance to allow sections of the pipeline to be isolated. The volume of oil that could be released due to a leak would be limited to the amount of oil that leaked prior to detection and the volume remaining in the isolatable section. Overall, the risk of a pipeline crude oil release is low due to safety mechanisms built into the pipeline system which will prevent a continuous release of oil. The Applicant will comply with their existing Coastal Louisiana Pipeline Facility Response Plan (PHMSA Sequence No. 3202), modified to include BMOP. With implementation of the safety design features for onshore facilities and the mitigation measures, potential impacts on surface water resources due to an oil spill are anticipated to be direct and adverse, and depending on the size of the spill, could be short-term or long-term and minor to major.

Aboveground Facilities

Impacts to surface water resources due to upsets and accidents at the aboveground facilities will be similar to those described for the onshore pipeline. The 15,000-barrel storage tanks at Station 701 are located within a secondary containment berm designed per NFPA requirements and will be capable of containing 110 percent of the capacity of one storage tank. With implementation of the safety design features for onshore facilities and the mitigation measures, impacts on surface water resources due to an oil spill are anticipated to be direct and adverse, and depending on the size of the spill, could be short-term or long-term and minor to major.

2.3.2.4 Decommissioning

Onshore Pipeline

At the time of decommissioning, the Applicant will abandon the pipeline in place, which will not result in any new negative impacts to surface water resources. Upon decommissioning, the Applicant will cease maintenance of the permanent ROW. This will allow for complete revegetation of any riparian buffers within the operational easement, thus reinstating natural erosion control mechanisms, which will slow water movement across the land and improve the filtering of water before it reaches nearby surface waters. These changes will lead to beneficial impacts on surface waters that will be long-term and negligible.

Aboveground Facilities

The aboveground facility sites do not contain any waterbodies; therefore, decommissioning will have neither positive nor negative impacts to surface water resources.

2.3.3 Wetlands

This section includes a discussion of the potential impacts to wetlands that may result from construction, operation, upsets and accidents, and decommissioning of the onshore components of the Project as well as measures that the Applicant will employ to minimize potential impacts on wetlands. The study area within which potential impacts were assessed included the Project workspaces and any areas that would be hydrologically connected to wetlands affected by the Project (i.e., within the same watershed). A summary of wetlands impacted by the Project is included in **Table 2-8**. **Attachment 2.B** of this report identifies the nearest milepost, Cowardin classification, crossing method, and acreage of each wetland that will be affected by the Project.

2.3.3.1 Construction and Installation

The primary impact of pipeline construction on wetlands will be the temporary alteration of wetland vegetation and the permanent conversion of any forested and scrub-shrub wetlands to emergent wetlands over the maintained permanent easement. Most of the wetland impacts resulting from construction of the Project will be temporary, as the marsh and emergent vegetation will recover over time.

Onshore Pipeline

Due to saturated conditions in the Project area, wetland crossings will primarily be installed using the push/pull method. The standard open cut and HDD construction method will also be used to cross wetlands along the route. Volume IIb, Topic Report 1 includes a description of these specialized construction techniques. The Applicant will avoid and minimize wetland impacts by collocating the pipeline with existing ROW for the extent possible and adhering to the measures outlined in its Project-specific Onshore Construction BMP Plan, which includes procedures to minimize wetland impacts.

Wetland impacts resulting from construction may vary based on construction techniques, and may include temporary ground disturbance, removal of wetland vegetation, temporary storage of dredged and/or excavated material, and rutting or compaction. Excavation of the pipeline trench, stockpiling of the trench spoil, and backfilling of the trench will disturb soils and could temporarily affect the rate and direction of water movement within wetlands. If contours and elevations are not properly restored, these effects could adversely impact wetland hydrology and revegetation by creating soil conditions that may not support wetland communities and hydrophytic vegetation at pre-construction levels.

If soils are not properly segregated during construction, the resulting mixed soil layers could alter biological components of the wetland and affect the reestablishment of native wetland vegetation. The temporary stockpiling of soil and movement of heavy machinery across wetlands could also lead to inadvertent compaction and furrowing of soils, which could alter natural hydrologic patterns, inhibit seed germination, and increase seedling mortality. Equipment could also introduce non-native and invasive species to the disturbed soil.

Altered surface drainage patterns, stormwater runoff, runoff from the trench, and discharge of hydrostatic test water could also negatively affect wetland regeneration. However, these effects will be avoided and minimized by installation and maintenance of sediment and erosion control BMPs throughout construction in accordance with the Onshore Construction BMP Plan. Sediment and erosion control BMPs will remain in place until revegetation is determined to be successful, thus limiting potential effects during the Project construction.

The effects of construction will be greatest during and immediately following construction. Generally, once the pipeline is in place, wetland vegetation communities will transition back to a community with a function similar to that of the wetland prior to construction. In emergent (E2EM, PEM), the impact of construction will be relatively minor and short term, because the herbaceous vegetation will regenerate quickly (generally within 1 to 3 years). Scrub-shrub wetland (PSS) impacts will also be minor and short term, but these wetlands could take 3 to 5 years to reach functionality similar to pre-construction conditions depending on the age and complexity of the wetland system. In forested wetlands (PFO), the impact of construction will be long term due to the long regeneration period of these vegetation types (30 years or more).

Accidental spills of construction-related fluids (e.g., oil, gasoline, or hydraulic fluids) on the landscape or directly into wetlands could result in water quality impacts. Impacts to wetlands will depend on the type and quantity of the product spilled, and the dispersal and attenuation characteristics of the wetland. If not adequately cleaned up, contaminated wetlands could have long-term impacts on wetland dependent species. By restricting the location of refueling and storage areas, and by cleaning up any inadvertent releases, the potential effects associated with spills or leaks of hazardous liquids will be avoided or minimized. To minimize wetland impacts, the Applicant will implement its SPAR Plan. During construction, the Applicant's EIs will ensure compliance with the SPAR Plan. With implementation of these measures, potential impacts on wetlands due to an inadvertent release of hazardous materials during construction will be direct, adverse, short-term, and minor.

As previously discussed, the HDD method can result in a frac-out, which could impact wetlands, the Applicant has developed an HDD Contingency Plan for the Project. The HDD Contingency Plan outlines the steps that the Applicant will take to prevent frac-outs from occurring, the proposed monitoring of drilling activities to detect a frac-out, and response actions that will be undertaken in the event of a frac-out.

Upon completion of construction, the pipeline workspaces will be returned, as closely as possible, to pre-construction contours and allowed to naturally revegetate in accordance with the Project-specific Revegetation Plan. Following construction, the Applicant will perform annual monitoring and maintenance within temporarily impacted wetland areas in according to the Project-specific Onshore Construction BMP Plan, Revegetation Plan, and USACE permit conditions, until restoration requirements have been met and the wetland areas have been successfully restored.

TABLE 2-8
Summary of Wetlands Affected by the Project

Facility	County/ Parish	Construction[a] (acres)					Operation[b] (acres)					Total Temporary Wetland Impacts (acres)	Total Permanent Loss of Wetlands[c] (acres)
		E2EM	PEM	PSS	PFO	Total	E2EM	PEM	PSS	PFO	Total		
Pipeline													
Onshore Pipeline	Jefferson	0.00	0.32	0.00	0.43	**0.75**	0.00	0.42	0.00	0.04	**0.46**	**1.21**	**0.00**
	Orange	15.49	40.44	0.23	10.49	**66.65**	6.73	16.98	0.00	5.50	**29.21**	**95.86**	**0.00**
	Cameron	86.08	0.00	0.00	0.00	**86.08**	41.84	0.00	0.00	0.00	**41.84**	**127.92**	**0.00**
Staging Areas													
Staging Areas	Jefferson	0.00	1.88	0.00	0.07	**1.95**	0.00	0.00	0.00	0.00	**0.00**	**1.95**	**0.00**
	Orange	0.00	0.67	0.00	0.11	**0.78**	0.00	0.00	0.00	0.00	**0.00**	**0.78**	**0.00**
	Cameron	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Aboveground Facilities													
MLVs 1-4	Orange	0.00	0.00	0.00	0.00	**0.00**	0.00	0.30	0.00	0.00	**0.30**	**0.00**	**0.30**
MLV 5-6	Cameron	0.09	0.00	0.00	0.00	**0.09**	0.00	0.00	0.00	0.00	**0.00**	**0.09**	**0.00**
BMOP Pump Station	Jefferson	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	0.0	**0.0**	**0.00**	**0.00**
Station 501	Cameron	0.69	0.00	0.00	0.00	**0.69**	1.62	0.00	0.00	0.00	**1.62**	**0.69**	**1.62**
Station 701	Cameron	0.90	0.00	0.00	0.00	**0.90**	0.46[d]	0.00	0.00	0.00	**0.46[d]**	**1.36**	**0.00**
Stingray Tap Removal	Cameron	1.29	0.00	0.00	0.00	**1.29**	0.63[d]	0.00	0.00	0.00	**0.63[d]**	**1.92**	**0.00**
Access Roads													
Access Roads	Jefferson	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
	Orange	0.00	0.09	0.00	0.00	**0.09**	0.00	0.29	0.00	0.00	**0.29**	**0.09**	**0.29**
	Cameron	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.00**
Project Summary													
TOTAL[e]		**104.54**	**43.40**	**0.23**	**11.09**	**159.26**	**51.28**	**17.99**	**0.00**	**5.54**	**74.81**	**234.07**	**2.21**

TABLE 2-8
Summary of Wetlands Affected by the Project

Facility	County/ Parish	Construction[a] (acres)					Operation[b] (acres)					Total Temporary Wetland Impacts (acres)	Total Permanent Loss of Wetlands[c] (acres)
		E2EM	PEM	PSS	PFO	Total	E2EM	PEM	PSS	PFO	Total		

Key:
Estuarine Intertidal Emergent (E2EM), Palustrine Emergent (PEM), Palustrine Scrub Shrub (PSS), Palustrine Forested (PFO), Right-of-way (ROW).

Notes:
[a] Construction Acreage = wetlands in workspace affected during construction activities (TWS & ATWS; excludes Operational ROW); Wetlands disturbed will be allowed to natural revegetate and return to pre-construction conditions.
[b] Operational acreage = wetlands in new 50-foot wide permanent ROW to be acquired, except in areas which wetlands will be avoided by HDD, as listed in **Attachment 2.B**. E2EM and PEM wetland types will be allowed to revert to pre-construction vegetation conditions. PFO wetlands within the permanent ROW will be converted to PSS or PEM wetlands; however, there will be no permanent loss of wetlands.
[c] Permanent loss of wetlands will result in aboveground facility expansion areas at Station 501, MLV sites, and new permanent access roads. The BMOP Pump Station site is proposed to be developed as part of the Nederland Terminal Buildout Project, which is anticipated to commence in January 2021, prior to construction of the BMOP Project. Therefore, the site will consist of developed land and will not result in wetland impacts.
[d] Mainline work at the Stingray Tap Removal Site and Station 701 will include ATWS (Construction impact) and Mainline permanent ROW (i.e., temporary impacts in the Operation ROW). These wetland areas will be restored to pre-construction conditions.
[e] Totals may not match sum of addends due to rounding.

Typically, wetlands can quickly revegetate with native flora through recruitment. No herbicides, fertilizers, or other non-natural chemicals will be used to facilitate revegetation, unless specifically requested by a regulatory agency.

In summary, impact on wetlands from construction of the pipeline is anticipated to be direct, adverse, short-term and minor in E2EM, PEM and PSS or long-term and minor in PFO wetlands because the Applicant will restore pre-construction contours and protect the wetland hydrology. The Applicant will minimize the unavoidable wetland impacts by implementing the measures outlined in the Applicant's Onshore Construction BMP Plan and SPAR Plan and conduct post-construction monitoring outlined in the Revegetation Plan. Additionally, the Applicant has prepared a USACE Section 404 permit application, which contains a Draft Compensatory Wetland Mitigation Plan (provided in Volume I, Appendix C-1) and will comply with conditions specified in its pending CWA Section 404 permit.

Aboveground Facilities

Mainline Valves

MLVs are required to be installed in locations along the pipeline system that are accessible to authorized employees and that are protected from damage and tampering in accordance with USDOT standards described in 49 CFR Part 195. The MLVs will also be installed in locations along the pipeline system that will minimize potential damage or pollution from accidental hazardous liquid discharges in accordance USDOT standards.

Results of the wetland delineation surveys determined that MLV 1, MLV 2, and MLV 4 are located in PEM wetland. MLV 3 is located in upland. MLV 5 is located in marsh classified as E2EM wetland and E1UB waterbody and MLV 6 is located in E1UB waterbody. Due to extensive wetlands in the Project area, wetland avoidance for placement of the MLVs was not practicable while complying with other regulatory and engineering requirements.

The sites for MLV 1 through MLV 4 in Orange County, Texas will be graded with gravel and/or shell and will result in long-term wetland impacts within the pipeline operational ROW. MLV 5 and MLV 6 in Cameron Parish, Louisiana will be installed on platforms due to the saturated conditions within the marsh and will result in temporary impacts. Similar to pipeline construction, ATWS at the MLV sites will result in temporary wetland impacts.

The Applicant will minimize the unavoidable wetland impacts in construction workspace areas by implementing the measures outlined in the Applicant's Onshore Construction BMP Plan and conduct post-construction monitoring outlined in the Revegetation Plan. The potential for inadvertent spills will be minimized by proper adherence to the SPAR Plan. Additionally, the Applicant will comply with conditions specified in its pending CWA Section 404 permit. Therefore, wetland impacts will be direct, highly localized, short-term to long-term, and minor.

BMOP Pump Station

The land for the BMOP Pump Station site is proposed to be developed as part of the Nederland Terminal Buildout Project, which is anticipated to commence in January 2021, prior to construction of the BMOP Project. Therefore, the site will consist of developed land and will not result in wetland impacts.

Station 501

Station 501 is an existing facility that will be converted and expanded to accommodate new equipment for the Project. All existing natural gas-related equipment will be removed from the Station and new pipeline facilities will be installed. The existing facility footprint will be expanded and ATWS will be required in wetland (E2EM) areas during construction. Due to extensive wetlands surrounding the existing facility, wetland avoidance for the expansion and placement of the ATWS is not possible. However, expansion of the permanent facility footprint has been placed within a previously disturbed area surrounded by an existing berm to minimize impacts.

Temporary wetland impacts (E2EM) in ATWS will be similar to the pipeline. Long-term impacts (E2EM) will occur in the expanded footprint. The Applicant will minimize the unavoidable wetland impacts in ATWS areas by implementing the measures outlined in the Applicant's Onshore Construction BMP Plan and conduct post-construction monitoring outlined in the Revegetation Plan. The potential for inadvertent spills will be minimized by proper adherence to the SPAR Plan. Additionally, the Applicant has prepared a USACE Section 10/404 permit application, which contains a Draft Compensatory Wetland Mitigation Plan (provided in Volume I, Appendix C-1) to mitigate temporary and permanent wetland impacts at this site and will comply with conditions specified in its pending CWA Section 404 permit. Therefore, impacts to wetlands will be direct, highly localized, short-term to long-term, and minor at Station 501.

Station 701

Station 701 is an existing facility that will be converted for the Project. Existing natural gas equipment will be removed from the station and new equipment and pipe will be installed within the existing facility boundaries. ATWS areas along the existing Mainline north of the facility boundary will be required during construction and will be returned, as closely as possible, to pre-construction contours and allowed to naturally revegetate.

Due to extensive wetlands surrounding the existing facility, wetland avoidance for placement of the ATWS is not possible. Temporary wetland impacts (E2EM) in ATWS will be similar to the pipeline. The Applicant will minimize the unavoidable wetland impacts in ATWS areas by implementing the measures outlined in the Applicant's Onshore Construction BMP Plan and conduct post-construction monitoring outlined in the Revegetation Plan. The potential for inadvertent spills will be minimized by proper adherence to the SPAR Plan. Additionally, the Applicant has prepared a USACE Section 10/404 permit application which contains a Draft Compensatory Wetland Mitigation Plan and will comply with conditions specified in its pending CWA Section 404 permit. Therefore, impacts to wetlands will be direct, highly localized, short-term, and minor at Station 701.

Stingray Tap Removal Site

The Stingray Tap is an existing natural gas facility located along the existing Stingray Mainline. ATWS within and adjacent to the existing Mainline permanent ROW will be required during construction and will be returned, as closely as possible, to pre-construction contours and allowed to naturally revegetate.

Due to extensive wetlands surrounding the existing facility, wetland avoidance for placement of the ATWS is not possible. Temporary wetland impacts (E2EM) in ATWS will be similar to the pipeline. The Applicant will minimize the unavoidable wetland impacts in ATWS areas by implementing the measures outlined in the Applicant's Onshore Construction BMP Plan and conduct post-construction monitoring outlined in the Revegetation Plan. The potential for inadvertent spills will be minimized by proper adherence to the SPAR Plan. Additionally, the Applicant has prepared a USACE CWA Section 10/404 permit application, which contains a Draft Compensatory Wetland Mitigation Plan, and will comply with

conditions specified in its pending CWA Section 404 permit. Therefore, impacts to wetlands will be direct, highly localized, short-term, and minor at the Stingray Tap removal.

Pipe and Contractor Yards/Staging Areas

The Applicant anticipates using existing laydown yards during onshore construction. Use of these yards will not result in impacts on wetlands, as they will continue to be used for their current purpose.

The Applicant is proposing to use staging areas during onshore construction. Impact on wetlands from construction of the staging areas is anticipated to be similar to pipeline construction (i.e., direct, adverse, short-term (i.e., emergent wetlands), long-term (forested wetlands), and minor.

Access Roads and Canals

The Applicant intends to utilize existing public roads, highways, and canals to access the sites during construction. Limited improvements (i.e., grading and gravel refresh) are planned for some existing private roads to support Project construction; however, widening of access roads is not anticipated to be required. One new temporary access road (TAR-05-A) will be required to access the construction ROW in Orange County, Texas. This temporary access road will impact PEM wetland and will be returned to pre-construction conditions following construction.

Four PARs will be required to extend existing roads to MLV sites (i.e., PAR-03, PAR-05, PAR-13, and PAR-15) which will require permanent gravel and fill in PEM wetlands. The Applicant will implement the measures outlined in its Onshore Construction BMP Plan to minimize erosion during construction. To minimize impacts to wetlands from inadvertent spills, the Applicant will adhere to the SPAR Plan. The Applicant has prepared a USACE Section 10/404 permit application, which contains a Draft Compensatory Wetland Mitigation Plan to mitigate temporary and permanent wetland impacts and will comply with conditions specified in its pending CWA Section 404 permit. Therefore, impacts to wetlands due to construction of the access roads will be direct, highly localized, long-term, and minor.

The access canals will not require improvements (i.e., dredging) for channel deepening or widening and will not impact wetlands.

2.3.3.1 Operations

Onshore Pipeline

Impacts associated with planned and unplanned maintenance may occur during the life of the Project. Following construction of the onshore pipeline, the permanent ROW will be maintained in an herbaceous state. Periodic maintenance could involve ground-disturbing activities or result in a release of hazardous material. Impacts and mitigation measures will be similar to those described for construction. Therefore, potential impacts associated with operation and maintenance of the onshore pipeline will be direct, adverse, short-term, and negligible to minor, depending on the activity.

Aboveground Facilities

Impacts associated with planned and unplanned maintenance may occur during the life of the Project. Periodic maintenance could involve ground-disturbing activities or result in a release of hazardous material. Impacts will be similar to those described for construction but at a smaller scale. During maintenance activities, the Applicant will adhere to the Onshore Construction BMP Plan and Coastal Louisiana Pipeline Facility Response Plan. Therefore, potential wetland impacts associated with operation

and maintenance of the aboveground facilities will be direct, highly localized, short-term, and negligible to minor, depending on the activity.

Access Roads and Canals

The Applicant intends to utilize existing public roads, highways, and canals to access the sites during operations and no impacts to wetlands are anticipated.

2.3.3.2 Upsets and Accidents

Onshore Pipeline

During operations, an unanticipated release of petroleum products, such as fuel, could lead to contamination and negatively impact wetland resources. Potential impacts to wetlands will depend on the type and quantity of the product spilled, and the dispersal and attenuation characteristics of the wetland. All leaks and spills potentially resulting in contamination will be contained and remedied on site as soon as practicable, and in compliance with the Applicant's Coastal Louisiana Pipeline Facility Response Plan (PHMSA Sequence No. 3202), modified to include BMOP. Volume IIa, Appendix H details the potential for an oil spill from the DWP or pipeline and the potential impacts that could result from the Project.

To minimize the potential occurrence of a large spill, the pipeline will be continuously monitored and constructed with MLVs (i.e., shut-off valves) to allow sections of the pipeline to be isolated remotely. The volume of oil that could be released due to a leak will be limited to the amount of oil that leaked prior to detection and the volume remaining in the isolatable section. Overall, the risk of a pipeline crude oil release is low due to safety mechanisms built into the pipeline system which will prevent a continuous release of oil. The Applicant will adhere to the Coastal Louisiana Pipeline Facility Response Plan during operations. With implementation of the safety design features for onshore facilities and the mitigation measures, potential impacts on wetland resources due to an oil spill are anticipated to be direct and adverse, and depending on the size of the spill, could be short-term or long-term and minor to major.

Aboveground Facilities

Potential impacts to wetland resources due to upsets and accidents at the aboveground facilities will be similar to those described for the onshore pipeline. The 10,000-barrel storage tanks at Station 701 are located within a secondary containment berm designed per NFPA requirements and will be capable of containing 110 percent of the capacity of one storage tank. To minimize impacts due to upsets and accidents, the Applicant will adhere to the Coastal Louisiana Pipeline Facility Response Plan during operations. With implementation of the safety design features for onshore facilities and the mitigation measures, potential impacts on wetland resources due to an oil spill are anticipated to be direct and adverse, and depending on the size of the spill, could be short-term or long-term and minor to major.

2.3.3.1 Decommissioning

The onshore pipeline is expected to have a lifespan of 25 years. At the time of decommissioning, the Applicant will seek to abandon the pipeline in place and restore the aboveground facilities and the MLV sites to pre-construction condition.

Onshore Pipeline

Upon decommissioning, the Applicant will cease the maintenance of the wetland vegetation within the operational easement. This will allow the wetland vegetation within the operational easement to grow undisturbed and will allow for the maturation of existing vegetation including shrub-scrub and forested

vegetation in the appropriate habitat types. The Applicant will comply with the environmental regulations applicable at the time of decommissioning to minimize potential impacts on the wetlands and will implement its SPAR Plan in the event of an accidental spill during decommissioning. These changes will lead to beneficial impacts on wetlands that will be long-term and negligible.

Aboveground Facilities

At the time of decommissioning, the Applicant will seek to remove the industrial facilities within the fence line, including all artificial land covering such as asphalt and gravel. During the removal of the operational facilities, potential impacts to wetlands will be similar to described for the construction of the aboveground facilities. Upon the removal of the facilities the cleaned site will be allowed to revegetate and revert to vegetation community similar to adjacent conditions. Restoration of wetlands will lead to beneficial impacts that will be long-term and negligible.

2.3.4 Floodplains

2.3.4.1 Construction and Installation

Onshore Pipeline

Potential impacts on floodplains from construction of the onshore pipeline could result from ground disturbing activities and changes in local relief. Although portions of the onshore pipeline ROW will be within designated 100-year and 500-year flood zones, temporary erosion control measures will be implemented during construction within all flood hazard zones, and all temporary workspaces and the permanently maintained operational easement will be restored and revegetated to their pre-construction contours and elevations. The onshore pipeline will be buried and is not anticipated to significantly alter flow patterns or flood storage. Therefore, the construction of the onshore pipeline may have temporary and negligible impacts on the floodplains.

Aboveground Facilities

Mainline Valves

The MLV sites are located in the 100-year flood zone. Within the fence line, the MLV sites will be composed of valves and the remainder of the site will be gravel, which will not result in an impervious surface. Although construction of the MLV sites will be located in the flood zone, the MLVs are not anticipated to significantly alter flow patterns or flood storage. The small impacts relative to the large floodplain system will have negligible, long-term impacts on floodplains.

BMOP Pump Station

The land needed for the BMOP Pump Station site is proposed to be developed as part of the Nederland Terminal Buildout Project, which is anticipated to commence in January 2021, prior to construction of the BMOP Project. Therefore, construction of the facility will not result in new impacts on floodplains.

Station 501

Station 501 is an existing facility that will be converted and expanded to accommodate new equipment. Although Station 501 will be expanded in the flood zone, it is not anticipated to significantly alter flow patterns or flood storage. The small impacts relative to the large floodplain system will have negligible, long-term impacts on floodplains and will only have above-grade piping associated with pig launchers and receivers.

Station 701

Station 701 is an existing facility that will be converted to accommodate new equipment within the existing facility boundaries. Although ATWS will be required at Station 701 in the flood zone, the area disturbed will be returned to pre-construction conditions and is not anticipated to significantly alter flow patterns or flood storage and is anticipated to have negligible, short-term impacts on floodplains.

Stingray Tap Removal

The Applicant will install a pre-tested pipeline segment following removal of the tap by TC Energy. ATWS within and adjacent to the existing Mainline permanent ROW will be required during construction and will be returned, as closely as possible, to pre-construction contours and allowed to naturally revegetate. Although ATWS will be located in the flood zone, the area disturbed will be returned to pre-construction conditions and is not anticipated to significantly alter flow patterns or flood storage and will have negligible, short-term impacts on floodplains. The above-ground equipment will be removed by TC Energy and will result in fewer impervious surface areas or structures after removal.

Access Roads and Canals

The Applicant intends to utilize existing public roads, highways, and canals to access the sites during construction. Limited improvements (i.e., grading and gravel refresh) are planned for some existing private roads to support Project construction; however, widening of access roads is not anticipated to be required. One new temporary access road (TAR-05-A) and four new PARs will be required in Orange County, Texas. The small impacts relative to the large floodplain system will have negligible, long-term impacts on floodplains.

2.3.4.2 Operations

Onshore Pipeline

All construction and operation onshore pipeline workspaces will be restored to pre-construction contours and elevations, as reasonably practicable. Therefore, there are no anticipated impacts on floodplains.

Aboveground Facilities

Following construction, the operation of the facility is anticipated to have negligible, long-term impacts on floodplains.

Access Roads and Canals

The Applicant intends to utilize existing public roads, highways, and canals to access the sites during operations and no impacts to floodplains are anticipated.

2.3.4.1 Upsets and Accidents

Onshore Pipeline

There will be no floodplain capacity impacts due to upsets or accidents along the onshore pipeline.

Aboveground Facilities

There will be no floodplain capacity impacts due to upsets or accidents at the aboveground facility sites.

2.3.4.2 Decommissioning

Onshore Pipeline

The onshore pipeline will be abandoned in place; therefore, no floodplain impacts due to decommissioning of the onshore pipeline will occur.

Aboveground Facilities

At the time of decommissioning, the Applicant will seek to remove the industrial facilities within the fence line, including all artificial land covering such as asphalt and gravel. During the removal of the operational facilities, potential impacts to floodplains will be similar to described for the construction of the aboveground facilities. Upon the removal of the facilities, the sites will be allowed to revegetate and revert back to pre-construction conditions. Restoration of floodplains will lead to beneficial impacts that will be long-term and negligible.

2.4 CUMULATIVE IMPACTS

A complete discussion of cumulative impacts is included in Volume IIa, Appendix C "Framework for Cumulative Impacts Analysis."

2.5 MITIGATION MEASURES

Construction, operation, and maintenance of the Project facilities will be in accordance with all applicable rules and regulations, permits, and approvals. To avoid and minimize potential impacts to groundwater, surface water, and wetlands during construction and operation of the Project, the Applicant has:

- Minimized the footprint by using the existing NT site for the construction of the BMOP Pump Station;
- Converted existing facilities (Stingray Mainline, Station 501, and Station 701) to minimize footprint of new disturbance and impacts to groundwater, wetlands and surface water resources;
- Collocated the onshore pipeline to the extent possible (approximately 32 percent) with existing ROW to minimize impacts on vegetation communities during construction and operation of the pipeline system;
- Converted approximately 103.4 miles of Stingray Mainline from natural gas to oil service will minimize impacts to onshore and offshore communities;
- Used the "push/pull" or "float" techniques to place the pipe in the trench where water and other site conditions allow; and
- Used existing roads and canals for Project access during construction to the extent possible.

The Applicant will implement the following plans (included in **Volume IIb, Appendix C** of Volume IIb) to ensure adequate protection of groundwater, surface water, and wetland resources during onshore construction. Offshore water and sediment quality and use measures are fully discussed in Volume IIa, Topic Report 6, "Wildlife and Protected Species."

- Project's Onshore Construction BMP Plan to avoid, minimize, and mitigate environmental impacts as they relate to the construction and operation of the Project (**Volume IIb, Appendix C-1**).

- Revegetation Plan to avoid and minimize introduction of invasive species and promote rapid revegetation (**Volume IIb, Appendix C-2**).
- SPAR Plan to avoid and minimize inadvertent spills and releases of oil and hazardous materials during construction of the proposed project (**Volume IIb, Appendix C-3**).
- Unanticipated Discovery Plan to address procedures in the event unanticipated discoveries (i.e., contaminated media) are made during construction of the proposed project (**Volume IIb, Appendix C-4**).
- HDD Contingency Plan to reduce the likelihood of inadvertent releases of drilling fluid/mud and will follow cleanup procedures should an inadvertent release occur (**Volume IIb, Appendix C-5)**.

Additionally, the Applicant has prepared a USACE Section 10/404 permit application, which contains a Draft Compensatory Wetland Mitigation Plan (provided in Volume I, Appendix C-1) and will comply with conditions specified in its pending CWA Section 404 permit. The Applicant will also comply with National Pollutant Discharge Elimination System (NPDES Discharge Permit Conditions for hydrostatic test water discharge.

2.6 SUMMARY OF POTENTIAL IMPACTS

The Project's effects on groundwater, surface water, and wetlands have been evaluated based on the criteria listed in **Table 1-10** in Section 1.10.2 (Evaluation Criteria) of Topic Report 1 (Volume IIb). The Project is NOT expected to:

- Violate a Federal, state, local, or Federally recognized international water quality criterion or waste discharge requirement;
- Cause irreparable harm to human health, aquatic life, or beneficial uses of aquatic ecosystems;
- Degrade groundwater quantity or quality;
- Degrade marine, coastal, or terrestrial (lakes, rivers, wetlands, tidal environments) water quality;
- Alter sediment composition, structure, or function; and/or
- Increase contaminant levels in the water column, sediment, or biota to levels shown to have the potential to harm organisms, even if the levels do not exceed the formal water quality criteria.

Activities associated with the construction, operation, and decommissioning of the onshore pipeline components that are likely to have environmental consequences on water and sediment quality and use are summarized in **Table 2-8**. Impacts on groundwater and surface water resources from construction, operation, and decommissioning of the onshore pipeline and aboveground facilities are expected to be negligible to moderate based on the proposed activities and the application of mitigation measures as listed in Section 2.5. Converting the Mainline, Station 501, and Station 701 will result in a reduction in amount of impacts that will occur from Project construction.

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ATTACHMENT 2.A
Waterbody Crossing Table

TABLE 2A-1
Waterbodies Crossed and Crossing Methods for the Onshore Pipeline

Facility/ Approximate MP[a]	County/ Parish	Waterbody ID	Waterbody Classification	Waterbody Name	Construction Crossing Method	Approx. Centerline Crossing Length[b] (feet)	Construction[c]		Operation[d]		Total Temporary Impacts (Acres)
							TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	
Onshore Pipeline											
0.52	Jefferson	SP1002	Canal	Unnamed	Open Cut	12.34	0.018	--	0.016	--	0.034
0.54	Jefferson	SP1001	Canal	Unnamed	Open Cut	32.68	0.052	--	0.032	--	0.085
0.93	Jefferson	H-001	R2UB	Neches River	HDD #1	828.63	--	--	0.000	0.949	0.000
1.06	Orange	H-001	R2UB	Neches River	HDD #1	493.84	--	--	0.000	0.576	0.000
2.72	Orange	H-081	E1UB	Canal to Neches River	HDD #2	239.37	--	--	0.000	0.274	0.000
2.73 – 3.83[a]	Orange	H-081	E1UB	Unnamed	Push/Pull	3,136.33	8.278	0.508	3.798	--	12.584
4.71	Orange	H-023	R2UB	Perennial Stream	Push/Pull	235.67	0.741	--	0.288	--	1.029
5.04	Orange	H-026	PUB	Pond	Push/Pull	133.45	0.682	--	0.222	--	0.903
5.29	Orange	H-032	R2UB	Perennial Stream	Push/Pull	404.04	0.866	--	0.457	--	1.323
5.38	Orange	H-032	R2UB	Perennial Stream	Push/Pull; Open Cut	247.90	0.597	--	0.299	--	0.897
5.79	Orange	H-039	PUB	Pond	Open cut	41.70	0.151	--	0.072	--	0.223
7.05	Orange	H-049	PUB	Unnamed Drainage	Open cut	13.22	0.138	--	0.089	--	0.227
7.27	Orange	H-054	PUB	Roadside Ditch	Open cut	29.29	--	--	0.019	--	0.019
7.64	Orange	H-057	PUBx	Roadside Ditch	Bore at Bessie Heights Road	3.02	0.004	--	0.003	--	0.004
8.07	Orange	H-058	PUB	Unnamed Drainage	Open Cut	9.15	0.021	--	0.010	--	0.031
8.21	Orange	H-060	PUBx	Unnamed Drainage	HDD #3	13.39	--	--	--	0.015	0.000
8.23	Orange	H-061	PUBx	Pond	HDD #3	107.74	--	--	--	0.114	0.000

TABLE 2A-1
Waterbodies Crossed and Crossing Methods for the Onshore Pipeline

Facility/ Approximate MP[a]	County/ Parish	Waterbody ID	Waterbody Classification	Waterbody Name	Construction Crossing Method	Approx. Centerline Crossing Length[b] (feet)	Construction[c]		Operation[d]		Total Temporary Impacts (Acres)
							TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	
9.64	Orange	H-070	PUB	Unnamed	HDD #4	19.91	--	--	--	0.013	0..000
10.03	Orange	H-083	PUBx	Pond	Open Cut	0.00	0.219	--	0.003	--	0.222
10.10	Orange	H-084	PUB	Unnamed Drainage	Open Cut	5.99	0.014	0.007	0.007	--	0.027
10.39	Orange	H-090	PUBx	Unnamed Drainage	HDD #5	12.32	--	--	--	0.014	0.000
10.40	Orange	H-091	PUBx	Unnamed Drainage	HDD #5	6.10	--	--	--	0.007	0.000
10.41	Orange	H-092	PUBx	Unnamed Drainage	HDD #5	24.39	--	--	--	0.028	0.000
10.76	Orange	H-098	PUBx	Unnamed Drainage	Open Cut	6.03	0.026	--	0.007	--	0.033
10.78	Orange	H-100	PUBx	Unnamed Drainage	ATWS	0.00	--	0.057	--	--	0.057
10.79	Orange	H-098	PUBx	Unnamed Drainage	Open Cut	6.14	0.015	--	0.007	--	0.023
11.04	Orange	H-105	PUBx	Unnamed Drainage	Open Cut	0.00	0.008	--	0.001	--	0.009
11.56 – 12.56	Orange	H-074	E1UB	Unnamed	Push/Pull	75.41	0.117	0.007	0.108	--	0.233
12.57 – 12.72	Orange	H-074	E1UB	Unnamed	HDD #6	180.74	--		--	0.176	0.000
12.73	Orange	H-075	E1UB	Canal	HDD #6	133.79	--	0.016	--	0.154	0.016
12.78	Orange	H-076	E1UB	Unnamed	HDD #6	104.52	--	--	--	0.112	0.000
13.78 - 13.82	Orange	H-114	E1UB	Sabine Lake	HDD #7 (outside shoreline)	221	--	--	---	0.270	0.00
13.82 – 14.10	Orange	H-114	E1UB	Sabine Lake	HDD #7 (inside lake)	1,503	8.625	--	1.725[e]	--	10.350
14.10 – 14.85	Orange	H-114	E1UB	Sabine Lake	Push/Pull	3,941	22.619	--	4.524	--	27.144

TABLE 2A-1
Waterbodies Crossed and Crossing Methods for the Onshore Pipeline

Facility/ Approximate MP[a]	County/ Parish	Waterbody ID	Waterbody Classification	Waterbody Name	Construction Crossing Method	Approx. Centerline Crossing Length[b] (feet)	Construction[c]		Operation[d]		Total Temporary Impacts (Acres)
							TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	
14.85 – 15.75	Orange	H-114	E1UB	Sabine Lake	HDD #8	4,762	27.327	--	5.465[e]	--	32.792
15.75 – 19.51	Orange	H-114	E1UB	Sabine Lake	Lay Barge	19,848	113.634	--	22.799	--	136.433
19.51 – 20.41	Cameron	H-114	E1UB	Sabine Lake	Lay Barge	4,751	27.628	--	5.430	--	33.058
20.41 – 20.81	Cameron	H-114	E1UB	Sabine Lake	HDD	2,114	12.128	--	2.425[e]	--	14.553
20.81 – 25.59	Cameron	H-114	E1UB	Sabine Lake	Lay Barge	25,216	144.622	--	28.956	--	173.578
25.59 - 26.00	Cameron	H-116	E1UB	Sabine Lake	Push/Pull	0.00	12.548	7.513	2.490	--	22.551
26.00 – 26.86	Cameron	H-116	E1UB	Unnamed	Push/Pull	644.10	1.482	--	0.753	--	2.235
26.87	Cameron	H-117	E1UB	Madame Johnsons Bayou	Push/Pull	123.08	0.219	--	0.160	--	0.379
26.91	Cameron	H-117	E1UB	Madame Johnsons Bayou	Push/Pull	12.13	0.025	--	0.014	--	0.039
26.95	Cameron	H-117	E1UB	Madame Johnsons Bayou	Push/Pull	139.26	0.323	0.002	0.160	--	0.486
26.99	Cameron	H-117	E1UB	Madame Johnsons Bayou	Push/Pull	73.65	0.199	0.028	0.103	--	0.330
27.04	Cameron	H-117	E1UB	Madame Johnsons Bayou	Push/Pull	82.17	0.171	--	0.095	--	0.266
27.04 – 28.16	Cameron	H-119	E1UB	Unnamed	Push/Pull	3,302.57	5.474	--	3.783	--	9.256
28.16 - 28.20	Cameron	H-120	E1UB	Johnsons Bayou	Push/Pull	225.51	0.537	--	0.258	--	0.795
28.20 – 30.01	Cameron	H-122	E1UB	Unnamed	Push/Pull	2,149.75	4.989	--	2.478	--	7.467
30.03	Cameron	H-131	E1UB	Deep Bayou	Push/Pull	481.24	1.050	--	0.578	--	1.628

TABLE 2A-1
Waterbodies Crossed and Crossing Methods for the Onshore Pipeline

Facility/ Approximate MP[a]	County/ Parish	Waterbody ID	Waterbody Classification	Waterbody Name	Construction Crossing Method	Approx. Centerline Crossing Length[b] (feet)	Construction[c]		Operation[d]		Total Temporary Impacts (Acres)
							TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	
30.15	Cameron	H-131	E1UB	Deep Bayou	Push/Pull	111.35	0.244	--	0.126	--	0.370
30.30	Cameron	H-131	E1UB	Deep Bayou	Push/Pull	144.21	0.279	--	0.156	--	0.436
30.04 – 30.93	Cameron	H-132	E1UB	Unnamed	Push/Pull	1,140.21	2.955	0.100	1.267	--	4.322
30.81	Cameron	H-132D	E1UB	Dredged Channel	Push/Pull	41.97	0.093	--	0.048	--	0.141
30.94 – 36.20	Cameron	H-124	E1UB	Unnamed	Push/Pull	9,406.44	23.736	1.536	10.995	--	36.267
35.07	Cameron	H-124D	E1UB	Dredged Channel	Push/Pull	108.26	0.256	--	0.125	--	0.380
36.21-37.02	Cameron	H-125	E1UB	Unnamed	Push/Pull	2,852.63	6.389	1.337	3.133	--	10.858
36.22	Cameron	H-125D	E1UB	Dredged Channel	Push/Pull	90.47	0.208	0.052	0.104	--	0.363
					TOTAL	**90,042.10 (17.05 miles)**	**429.707**	**3.627**	**93.973**	**2.702**	**544.456**
Staging Areas											
Staging Area 1											
0.50	Jefferson	SA-1	PUBx	Canal	N/A	N/A	N/A	0.028	N/A	N/A	0.028
0.51	Jefferson	SP1002	PUBx	Canal	N/A	N/A	N/A	0.048	N/A	N/A	0.048
Staging Area 2											
1.66	Orange	H-001	R2UB	None	N/A	N/A	N/A	0.001	N/A	N/A	0.001
Staging Area 3											
	Orange	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Staging Area 4											
6.05	Orange	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Staging Area 5											
	Orange	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A

TABLE 2A-1
Waterbodies Crossed and Crossing Methods for the Onshore Pipeline

Facility/ Approximate MP[a]	County/ Parish	Waterbody ID	Waterbody Classification	Waterbody Name	Construction Crossing Method	Approx. Centerline Crossing Length[b] (feet)	Construction[c]		Operation[d]		Total Temporary Impacts (Acres)
							TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	
Staging Area 6											
	Orange	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Staging Area 7											
8.23	Orange	H-060	PUBx	Unnamed pond	ATWS	N/A	N/A	0.052	N/A	N/A	0.052
Staging Area 8											
	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Staging Area 9											
	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Staging Area 10											
	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Staging Area 11											
	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Staging Area 12											
	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
						TOTAL	**0**	**0.129**	**0**	**0**	**0.129**
Aboveground Facilities											
Mainline Valves											
MLV 1 (MP 1.65)	Orange	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MLV 2 (MP 4.97)	Orange	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MLV 3 (MP 10.84)	Orange	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MLV 4 (13.01)	Orange	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A

TABLE 2A-1
Waterbodies Crossed and Crossing Methods for the Onshore Pipeline

Facility/ Approximate MP[a]	County/ Parish	Waterbody ID	Waterbody Classification	Waterbody Name	Construction Crossing Method	Approx. Centerline Crossing Length[b] (feet)	Construction[c]		Operation[d]		Total Temporary Impacts (Acres)
							TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	
MLV 5 (MP 26.98)	Cameron	H-117	E1UB	Unnamed	MLV to be installed on a platform	N/A	0.000	0.000	0.022 [f]	N/A	0.022
MLV 6 (30.92)	Cameron	H-122	E1UB	Unnamed	MLV to be installed on a platform	N/A	0.000	0.000	0.115 [f]	N/A	0.115
						TOTAL	**0**	**0**	**0.137**	**0**	**0.137**
BMOP Pump Station											
0.00	Jefferson	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Station 501											
37.00	Cameron	H-125 / H-127	E1UB	Unnamed	N/A	N/A	0.000	0.012	0.005[g]	N/A	0.012Temp. 0.005 Perm.
Station 701											
N/A	Cameron	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Stingray Tap Removal Site											
N/A	Cameron	H-127 / H-129	E1UB	Unnamed	Open Cut	N/A	0.244	0.487	0.00	N/A	0.731
Access Roads and Canals											
Access Roads – No Impacts to Waterbodies											
Access Canals											
TAC-02 (MP 1.68)	Orange	H-001	R2UB	Neches River to Barge Slip	N/A	3,500.96[h]	N/A	0.00 [i]	N/A	N/A	0.00
TAC-04 (MP 2.73)	Orange	H-081	E1UB	Canal from Neches River to ROW	N/A	7,678.30[h]	N/A	0.00 [i]	N/A	N/A	0.00
PAC-15-B (MP 12.35)	Orange	H-075	E1UB	Unnamed Canal	N/A	2,636.13[h]	N/A	0.00 [i]	N/A	N/A	0.00

TABLE 2A-1
Waterbodies Crossed and Crossing Methods for the Onshore Pipeline

Facility/ Approximate MP[a]	County/ Parish	Waterbody ID	Waterbody Classification	Waterbody Name	Construction Crossing Method	Approx. Centerline Crossing Length[b] (feet)	Construction[c]		Operation[d]		Total Temporary Impacts (Acres)
							TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	
PAC-15-C (MP 12.87)	Orange	H-075	E1UB	Unnamed Canal	N/A	4,574.70[h]	N/A	0.00[i]	N/A	N/A	0.00
PAC-16 (MP 26.95)	Cameron	H-117	E1UB	Madame Johnson Bayou (from ROW to Sabine Lake)	N/A	7,926.46[h]	N/A	0.00[i]	N/A	N/A	0.00
TAC-17 (MP 28.18)	Cameron	H-120	E1UB	Johnson Bayou (from ROW to Sabine Lake)	N/A	11,242.88[h]	N/A	0.00[i]	N/A	N/A	0.00
					TOTAL	**37,559.43 (7.11 miles)**	**0**	**0**	**0**	**0**	**0**

ATWS=Additional Temporary Workspace
HDD=Horizontal Directional Drill
ROW=Right-of-Way
Notes:
[a] MP range indicates large wetland/waterbody complex with multiple wetlands and waterbodies that are hydrologically connected. Acreages represents sum of multiple waterbody crossings.
[b] Value of 0 indicates the feature is not crossed by pipeline centerline and is only crossed by workspace. For wetland/waterbody complex areas crossed, value represents cumulative total.
[c] Construction Acreage = all workspace during construction activities (TWS & ATWS; excludes Operational ROW)
[d] Operational ROW acreage reflects new 50-foot wide permanent ROW that will be temporarily disturbed during construction. HDD crossing method and bore method (i.e., road crossing) will avoid temporary waterbody disturbance in the permanent ROW (except for Sabine Lake as noted in "e").
[e] HDD construction method within Sabine Lake will result in temporary impacts due to overlap of construction vessels and Push/Pull and lay barge workspace.
[f] MLV 5 and MLV 6 will be installed on a platform. Therefore, impacts will be temporary.
[g] Station 501 will be expanded resulting in permanent (fill) impact of EIUB waterbody (0.005 acre).
[h] Length represents access canal length (not approximate centerline crossing length).
[i] Access canals will not require dredging.

ATTACHMENT 2.B
Wetland Crossing Table

TABLE 2B-1
Wetlands Affected by the Project

Facility/ Approximate MP[a]	County/ Parish	Wetland ID	Wetland Classification	Construction Crossing Method	Approx. Centerline Crossing Length[b] (feet)	Construction[c]		Operation[d]		Total Affected Area (Acres)
						TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	
Onshore Pipeline										
0.53 – 0.54	Jefferson	WP1001_PFO_L	PFO	Open Cut	0.00	0.413	--	0.018	--	0.431
0.53 – 0.67	Jefferson	WP1001-PEM_P	PEM	Open Cut	395.57	0.316	--	0.420	--	0.736
0.60	Jefferson	WP1001_PFO_M	PFO	Open Cut	22.41	0.014	--	0.025	--	0.039
0.60 – 0.61	Jefferson	WP1001_PFO_M	PFO	HDD	18.65	--	--	--	0.020	0.000
0.61 – 0.67	Jefferson	WP1001-PEM_P	PEM	HDD	250.67	--	--	--	0.267	0.000
0.62	Jefferson	WP1001_PFO_K	PFO	HDD	178.79	--	--	--	0.260	0.000
1.11	Orange	H-002	PEM	HDD	16.11	--	--	--	0.021	0.000
1.13	Orange	H-003	PFO	HDD	267.26	--	--	--	0.324	0.000
1.20	Orange	H-004	PEM	HDD	51.87	--	--	--	0.058	0.000
1.21-1.23	Orange	H-005	PFO	HDD	102.08	0.016	--	--	0.124	0.016
1.32 – 1.36	Orange	H-007	PFO	Open Cut	408.33	0.489	--	0.424	--	0.913
1.37	Orange	H-079	PEM	Open Cut	21.38	0.341	--	0.063	--	0.404
1.63 – 1.68	Orange	H-008	PEM	Open Cut	214.30	0.443	0.114	0.214	--	0.771
1.67	Orange	H-008	PEM	Bore	40.00	--	--	--	0.045	0.000
1.68	Orange	H-009	PEM	Bore	40.00	--	--	--	0.045	0.000
1.69 – 2.60	Orange	H-009	PEM	Push/Pull	4,345.91	10.065	3.676	4.989	--	18.730
2.61	Orange	H-009	PEM	HDD	969.88	--	--	--	1.114	0.000
2.81	Orange	H-080	E2EM	HDD	692.28	--	--	--	0.795	0.000
2.92 - 3.64	Orange	H-080	E2EM	Push/Pull	1,877.61	3.523	1.687	1.976	--	7.186
3.84	Orange	H-010	PEM	Push/Pull	146.53	0.329	0.027	0.171	--	0.527
3.98	Orange	H-011	PFO	Push/Pull	272.00	0.382	--	0.308	--	0.690
3.99	Orange	H-012	PEM	Push/Pull	0.00	0.024	--	--	--	0.024

TABLE 2B-1
Wetlands Affected by the Project

Facility/ Approximate MP[a]	County/ Parish	Wetland ID	Wetland Classification	Construction Crossing Method	Approx. Centerline Crossing Length[b] (feet)	Construction[c]		Operation[d]		Total Affected Area (Acres)
						TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	
4.04	Orange	H-013	PEM	Push/Pull	0.00	0.181	--	--	--	0.181
4.08	Orange	H-014	PFO	Push/Pull	22.76	0.093	--	0.035	--	0.128
4.16	Orange	H-015	PFO	Push/Pull	180.98	1.086	--	0.272	--	1.358
4.19	Orange	H-016	PEM	Push/Pull	0.00	0.026	--	--	--	0.026
4.34	Orange	H-017	PEM	Push/Pull	251.34	0.766	--	0.299	--	1.065
4.35	Orange	H-018	PFO	Push/Pull	160.77	0.137	--	0.179	--	0.316
4.52	Orange	H-019	PEM	Push/Pull	37.57	0.244	--	0.055	--	0.299
4.60	Orange	H-020	PEM	Push/Pull	245.84	0.669	--	0.315	--	0.984
4.60	Orange	H-021	PEM	Push/Pull	0.00	0.054	--	0.004	--	0.058
4.60	Orange	H-022	PFO	Push/Pull	92.86	0.000	--	0.055	--	0.055
4.74	Orange	H-024	PEM	Push/Pull	130.14	0.102	--	0.126	--	0.228
4.87	Orange	H-025	PEM	Push/Pull	970.27	2.519	1.284	1.102	--	4.905
4.99	Orange	H-027	PEM	Push/Pull	161.09	0.202	0.009	0.244	--	0.455
5.01	Orange	H-028	PFO	Push/Pull	168.47	0.094	--	0.125	--	0.219
5,11	Orange	H-029	PEM	Push/Pull	0.00	0.070	--	--	--	0.070
5.17	Orange	H-030	PFO	Push/Pull	497.71	0.966	--	0.566	--	1.532
5.24	Orange	H-031	PEM	Push/Pull	195.57	0.455	--	0.223	--	0.678
5.35	Orange	H-033	PEM	Push/Pull	147.79	0.190	--	0.166	--	0.356
5.43	Orange	H-033	PEM	Open Cut	215.05	0.501	--	0.237	--	0.738
5.45	Orange	H-034	PFO	Open Cut	181.64	0.312	--	0.211	--	0.523
5.77	Orange	H-037	PFO	Open Cut	98.35	0.195	--	0.115	--	0.310
5.83	Orange	H-040	PFO	Open Cut	346.23	0.628	--	0.400	--	1.028
5.88	Orange	H-041	PEM	Open Cut	109.10	0.138	--	0.074	--	0.212

TABLE 2B-1
Wetlands Affected by the Project

Facility/ Approximate MP[a]	County/ Parish	Wetland ID	Wetland Classification	Construction Crossing Method	Approx. Centerline Crossing Length[b] (feet)	Construction[c]		Operation[d]		Total Affected Area (Acres)
						TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	
6.00	Orange	H-042	PEM	Open Cut	0.00	0.083	--	0.007	--	0.090
6.11	Orange	H-043	PEM	Open Cut	0.00	0.039	--	--	--	0.039
6.11	Orange	H-044	PFO	Open Cut	0.00	0.141	--	0.044	--	0.185
6.34	Orange	H-045	PEM	Open Cut	0.00	0.007	--	--	--	0.007
6.61	Orange	H-046	PEM	Open Cut	0.00	0.055	--	--	--	0.055
6.73	Orange	H-047	PEMx	Open Cut	5.16	0.009	--	0.006	--	0.015
6.74	Orange	H-048	PEMx	Open Cut	5.17	0.009	--	0.006	--	0.015
7.05	Orange	H-050	PEM	Open Cut	11.15	0.051	--	0.020	--	0.071
7.10	Orange	H-051	PFO	Open Cut	464.21	0.365	--	0.460	--	0.825
7.16	Orange	H-052	PEM	Open Cut	142.30	0.320	--	0.148	--	0.468
7.25	Orange	H-055	PEM	Open Cut	21.98	0.075	--	0.037	--	0.112
8.17	Orange	H-059	PEM	Open Cut	102.72	0.248	0.107	0.129	--	0.484
8.19	Orange	H-059	PEM	HDD	26.70	--	--	--	0.031	0.000
8.32	Orange	H-064	PEM	HDD	2,095.54	--	--	--	2.235	0.000
8.39	Orange	H-111	PFO	HDD	256.96	--	--	--	0.355	0.000
8.62	Orange	H-110	PFO	HDD	0.00	--	--	--	0.019	0.000
8.71	Orange	H-109	PSS	HDD	192.41	--	--	--	0.306	0.000
8.81	Orange	H-109	PSS	Open Cut	0.00	0.173	0.058	0.000	--	0.231
8.85	Orange	H-062	PFO	Open Cut	747.61	1.615	0.250	0.785	--	2.650
9.06	Orange	H-063	PFO	Open Cut	0.00	0.003	--	--	--	0.003
9.12	Orange	H-064	PEM	Open Cut	1,135.82	2.625	0.040	1.305	--	3.970
9.19	Orange	H-065	PFO	Open Cut	128.48	0.263	0.075	0.155	--	0.493
9.27	Orange	H-066	PFO	Open Cut	156.19	1.054	--	0.370	--	1.424

TABLE 2B-1
Wetlands Affected by the Project

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						TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	
9.51	Orange	H-068	PFO	HDD	72.87	--	--	--	0.098	0.000
9.62	Orange	H-069	PEM	HDD	76.02	--	--	--	0.055	0.000
9.64	Orange	H-071	PEM	HDD	172.92	--	--	--	0.218	0.000
10.26	Orange	H-085	PEM	HDD	0.00	--	--	--	0.019	0.000
10.27	Orange	H-086	PEM	HDD	7.94	--	--	--	0.009	0.000
10.33	Orange	H-088	PEM	HDD	555.23	--	--	--	0.603	0.000
10.38	Orange	H-089	PFO	HDD	0.00	--	--	--	0.010	0.000
10.51	Orange	H-094	PFO	HDD	14.40	--	--	--	0.018	0.000
10.57	Orange	H-094	PFO	Open Cut	584.43	1.201	0.154	0.666	--	2.021
10.71	Orange	H-095	PEM	Open Cut	33.89	0.143	--	0.036	--	0.179
10.72	Orange	H-096	PFO	Open Cut	89.11	0.031	--	0.060	--	0.091
10.79	Orange	H-099	PEM	Open Cut	0.00	--	0.046	--	--	0.046
10.80	Orange	H-101	PEM	Open Cut	0.00	0.067	0.111	0.003	--	0.181
10.81	Orange	H-102	PFO	Open Cut	0.00	0.073	--	0.008	--	0.081
10.86	Orange	H-103	PEM	Push/Pull	0.00	0.052	0.050	--	--	0.102
10.90	Orange	H-104	PEM	Push/Pull	1,294.37	1.536	0.117	1.345	--	2.998
11.19	Orange	H-106	PEM	Push/Pull	0.00	0.070	--	--	--	0.070
11.26	Orange	H-107	PFO	Push/Pull	196.21	0.868	--	0.262	--	1.130
11.42	Orange	H-108	PEM	Push/Pull	1,446.53	3.314	--	1.666	--	4.980
11.60	Orange	H-073	E2EM	Push/Pull	4,155.99	9.696	0.587	4.753	--	15.036
12.47	Orange	H-073	E2EM	HDD	1,691.18	--	--	--	1.975	0.000
12.77	Orange	H-077	E2EM	HDD	27.68	--	--	--	0.033	0.000
12.80	Orange	H-078	E2EM	HDD	60.83	--	--	--	0.080	0.000

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Wetlands Affected by the Project

Facility/ Approximate MP[a]	County/ Parish	Wetland ID	Wetland Classification	Construction Crossing Method	Approx. Centerline Crossing Length[b] (feet)	Construction[c]		Operation[d]		Total Affected Area (Acres)
						TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	
12.91	Orange	H-112	PEM	HDD	666.59	--	--	--	0.757	0.000
12.99	Orange	H-112	PEM	Open Cut	3,475.00	8.077	0.764	3.989	--	12.830
13.69	Orange	H-112	PEM	HDD	435.06	--	--	--	0.490	0.000
13.76	Orange	H-113	E2EM	HDD	155.34	--	--	--	0.172	0.000
26.00 – 26.94	Cameron	H-115	E2EM	Push/Pull	4,168.32	9.874	--	4.776	--	14.650
26.96 – 28.16	Cameron	H-118	E2EM	Push/Pull	2,739.19	8.630	0.132	3.135	--	11.897
28.20 – 30.01	Cameron	H-121	E2EM	Push/Pull	7401.03	17.163	--	8.504	--	25.667
30.05 – 30.94	Cameron	H-133	E2EM	Push/Pull	2,885.17	6.385	0.001	3.320	--	9.706
30.94 - 36.20	Cameron	H-123	E2EM	Push/Pull	18,232.52	39.699	1.379	20.729	--	61.807
36.21 – 37.02	Cameron	H-126	E2EM	Push/Pull	1,082.05	2.529	0.290	1.371	--	4.190
				TOTAL	**71,349.11 (13.51 miles)**	**142.526**	**10.958**	**71.506**	**10.556**	**224.990**
Staging Areas										
Staging Area 1										
SA-1 (0.50)	Jefferson	Wetland 6/ WP1001_PEM_P	PEM	N/A	N/A	N/A	1.884	N/A	N/A	1.884
		WP1001_PEM_K								
		WP1001_PEM_N								
		Wetland 3	PFO	N/A	N/A	N/A	0.065	N/A	N/A	0.065
		WP1001_PFO								
		WP1001_PFO_M								
Staging Area 2										
SA-2 (1.69)	Orange	H-008	PEM	N/A	N/A	N/A	0.398	N/A	N/A	0.398
		H-009								

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						TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	
Staging Area 3										
SA-3 (5.30)	Orange	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A
Staging Area 4										
SA-4 (6.08)	Orange	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A
Staging Area 5										
SA-5 (7.17)	Orange	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A
Staging Area 6										
SA-6 (7.69)	Orange	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A
Staging Area 7										
SA-7 (8.21)	Orange	H-059	PEM	N/A	N/A	N/A	0.244	N/A	N/A	0.244
Staging Area 8										
SA-8 (9.43)	None	H-066	PFO	N/A	N/A	N/A	0.110	N/A	N/A	0.110
Staging Area 9										
SA-9 (9.31)	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Staging Area 10										
SA-10 (10.26)	None	H-086	PEM	N/A	N/A	N/A	0.026	N/A	N/A	0.026
Staging Area 11										
SA-11 (10.45)	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Staging Area 12										

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Facility/ Approximate MP[a]	County/ Parish	Wetland ID	Wetland Classification	Construction Crossing Method	Approx. Centerline Crossing Length[b] (feet)	Construction[c]		Operation[d]		Total Affected Area (Acres)
						TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	
SA-12 10.78	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
					TOTAL		**2.727**			**2.727**
Aboveground Facilities										
Mainline Valves										
MLV 1 (MP 1.65)	Orange	H-008	PEM	N/A	N/A	N/A	N/A	0.070	N/A	0.070 Perm.
MLV 2 (MP 4.97)	Orange	H-025	PEM	N/A	N/A	N/A	N/A	0.115	N/A	0.115 Perm.
MLV 3 (MP 10.84)	Orange	None	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MLV 4 (13.01)	Orange	H-112	PEM	N/A	N/A	N/A	N/A	0.115	N/A	0.115 Perm.
MLV 5 (MP 26.98)	Cameron	H-117 H-118	E2EM	N/A	MLV to be installed on a platform	N/A	N/A	0.093 [e]	N/A	0.093
MLV 6 (30.92)	Cameron	None	None	N/A	MLV to be installed on a platform	N/A	N/A	N/A	N/A	N/A
					TOTAL			**0.393**		**0.300 Perm.** **0.093 Temp.**
BMOP Pump Station										
0.00	Jefferson	None	None	None	N/A	N/A	N/A	N/A	N/A	N/A
Station 501										
37.01	Cameron	H-126	E2EM	N/A	N/A	N/A	0.694	1.620 [f]	N/A	**1.620 Perm.** **0.694 Temp.**
Station 701										
N/A	Cameron	H-128	E2EM	N/A	N/A	N/A	0.898	0.463 [g]	N/A	1.361

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						TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	
Stingray Tap Removal Site										
N/A	Cameron	H-126	E2EM	N/A	N/A	1.286	0.000	0.635 [g]	N/A	1.921
N/A	Cameron	H-128								
Access Roads and Canals										
Access Roads										
TAR-01 (MP 0.53)	Jefferson	None	None	N/A	82.15 [h]	N/A	N/A	N/A	N/A	N/A
PAR-03 (MP 1.68)	Orange	H-008	PEM	N/A	14,571.74 [h]	N/A	N/A	0.021	N/A	0.021 Perm.
TAR-03-A (MP 1.73)	Orange	None	None	N/A	891.08 [h]	N/A	N/A	N/A	N/A	N/A
PAR-05 (MP 4.98)	Orange	H-025	PEM	N/A	6,588.91 [h]	N/A	N/A	0.016	N/A	0.016 Perm.
TAR-05-A (MP 5.36)	Orange	H-033	PEM	N/A	4,768.29 [h]	N/A	0.090	N/A	N/A	0.090
TAR-06 (MP 5.69)	Orange	None	None	N/A	7,670.76 [h]	N/A	N/A	N/A	N/A	N/A
TAR-06-A (6.10)	Orange	None	None	N/A	44,145.86 [h]	N/A	N/A	N/A	N/A	N/A
TAR-07 (MP 6.74)	Orange	None	None	N/A	247.00 [h]	N/A	N/A	N/A	N/A	N/A
TAR-08 (MP 7.28)	Orange	None	None	N/A	743.84 [h]	N/A	N/A	N/A	N/A	N/A
TAR-09 (MP 7.67)	Orange	None	None	N/A	58.81 [h]	N/A	N/A	N/A	N/A	N/A
TAR-10 (8.23)	Orange	None	None	N/A	392.10 [h]	N/A	N/A	N/A	N/A	N/A
TAR-11	Orange	None	None	N/A	3,740.62 [h]	N/A	N/A	N/A	N/A	N/A

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						TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	
(MP 9.46)										
TAR-12 (MP 10.28)	Orange	None	None	N/A	4,991.49 [h]	N/A	N/A	N/A	N/A	N/A
TAR-12-A (MP 10.40)	Orange	None	None	N/A	3,509.25 [h]	N/A	N/A	N/A	N/A	N/A
PAR-13 (MP 10.76)	Orange	H-101	PEM	N/A	4,674.70 [h]	N/A	N/A	0.019	N/A	0.019 Perm.
TAR-14 (MP 10.78)	Orange	None	None	N/A	4,290.2 [h]	N/A	N/A	N/A	N/A	N/A
PAR-15 (MP 12.84)	Orange	H-112	PEM	N/A	1,733.44 [h]	N/A	N/A	0.229	N/A	0.229 Perm.
PAR-19 (MP 30.94)	Cameron	None	None	N/A	14,087.64 [h]	N/A	N/A	N/A	N/A	N/A
TAR-20-A (MP 36.21)	Cameron	None	None	N/A	2,507.6 [h]	N/A	N/A	N/A	N/A	N/A
PAR-20 (MP 36.98)	Cameron	None	None	N/A	24,199.68 [h]	N/A	N/A	N/A	N/A	N/A
TAR-20-B (MP 37.01)	Cameron	None	None	N/A	5,620.94 [h]	N/A	N/A	N/A	N/A	N/A
Access Canals (See Waterbody Crossing Table)										
					Access Road Total	**N/A**	**0.090**	**0.285**	**N/A**	**0.285 Perm.** **0.090 Temp.**
					GRAND TOTAL	**143.812**	**15.367**	**73.799**	**10.556**	**2.205 Perm.** **231.876 Temp.**

Notes:
HDD=Horizontal Directional Drill
Perm.=Permanent Impact
Temp.=Temporary Impact

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						TWS (acres)	ATWS (acres)	Permanent ROW (acres)	HDD (acres avoided)	

[a] MP range indicates large wetland/waterbody complex with multiple wetlands and waterbodies that are hydrologically connected. Acreages represents sum of multiple wetland crossings.
[b] Value of 0 indicates the feature is not crossed by pipeline centerline and is only crossed by workspace. For wetland/waterbody complex areas crossed, value represents cumulative total.
[c] Construction Acreage = all workspace during construction activities (TWS & ATWS; excludes Operational ROW)
[d] Operational ROW acreage reflects new 50-foot wide permanent ROW that will be temporarily disturbed during construction. HDD crossing method and bore method (i.e., road crossing) will avoid temporary wetland disturbance in the permanent ROW.
[e] MLV 5 will be installed on a platform. Therefore, impacts will be temporary because no permanent fill is utilized (per USACE recommendations).
[f] Station 501 will be expanded resulting in permanent (fill) impact of E2EM wetland.
[g] Represents temporary construction impacts within the existing Mainline permanent ROW.
[h] Length represents access road length (not approximate centerline crossing length).